

Gujarat Forest Department
The State of Gujarat
Republic of India

Preparatory Study for Project for Ecosystem Restoration in Gujarat

**Final Report
Advanced Version**

January 2020

Japan International Cooperation Agency (JICA)

Kokusai Kogyo Co., Ltd.

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JR (P)
19-036

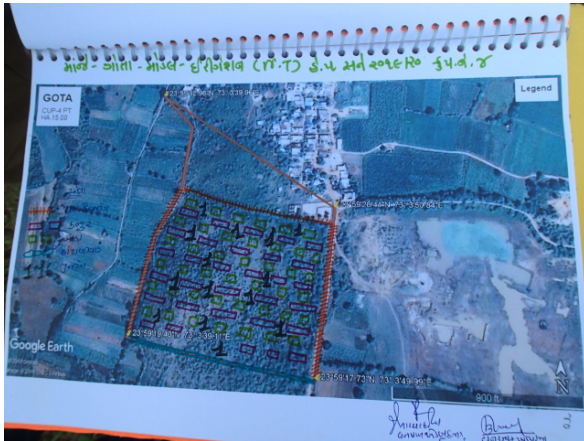
Photographs of the Study



Nursery for the next year plantation in Raygadh Range, Sabarkantha Division



New bamboo-model plantation in Sabarkantha Division



Coup layout map prepared for irrigation-model Gota Plantation in Sabarkantha Division



Dense forest area on steep range of hills near Polo Forest in Sabarkantha Division



New barren and green hills-model plantation in Ambaji Range, Banaskantha Division



New irrigation-model plantation under the management plan in Banaskantha Division



Water holes located in deciduous forest areas in Gir Somnath Division



Lantana weeds to be removed in Jamvala Range, Gir Somnath Division



Well maintained grass plantation in Jamvala Range, Gir Somnath Division



Poorly maintained grass plantation in Jamvala Range, Gir Somnath Division



Grassland for wildlife animals in Devalia Safari Park, Gir National Park & Wildlife Sanctuary



Tablet with eGujForest modules distributed to field officers in the lion landscape area in Sasan Gir region



Near view of mangrove plantation on Hazila Island in Surat Division



New mangrove plantation as a part of CSR activities in Surat Division



CBO members working at the mangrove plantation site in the Gulf of Kambhath (Project funded by CSR of Japanese Company)



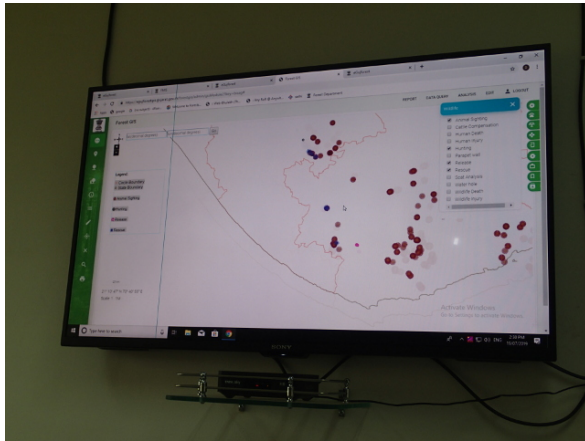
Mangrove nursery work by the CBO members in the Gulf of Kambhath (Project funded by CSR of Japanese Company)



Bamboo furniture workshop at Visdalia Cluster Cooperative Society, Surat District



Mother Spice by Visdalia Cluster Cooperative Society, Surat District



eGujForest operation (GIS data visualization) in Aravalli Division Office



Exterior appearance of Aravalli Division Office



Basic IT supplies for documentation in Shyamlaji Range Office in Aravalli Division



Exterior appearance of Shyamlaji Range Office in Aravalli Division



Gir Hi-Tech Monitoring Unit for the lion landscape area in Sasan Gir Wildlife Division



Spatial data analysis by GIS operator in Sasan Gir Wildlife Division

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Abbreviations

Abbreviation	English Name
ACF	Assistant Conservator of Forests
AMC	Annual Maintenance Contract
APCCF	Additional Principal Chief Conservator of Forests
APEDA	Agricultural and Processed Food Products Export Development Authority
BAIF	An organization in Gujarat undertaking research and developmental interventions
BCPLIP	Biodiversity Conservation and Rural Livelihoods Improvement Project
BISAG	Bhaskaracharya Institute for Space Applications and Geo-Informatics
BOT	Build-Operate-Transfer
BOOT	Build-Own-Operate-Transfer
BOLT	Build-Operate-Lease-Transfer
BTL	Build-Transfer-Lease
CAMPA	Compensatory Afforestation Management and Planning Authority
CAR	Civil Aviation Requirements
CCTV	Closed Circuit Television
CDP	Carbon Disclosure Project
CGCERT	Chhattisgarh Certification Society for Forestry & Agriculture
CII	Confederation of Indian Industries
CMMI	Capability Maturity Model Integration
CoC	Chain of Custody
C/P	Counterpart
CPSU	Central Public Sector Understanding
CRZ	Coastal Regulation Zone
CSR	Corporate Social Responsibility
DBFOT	Design-Build-Finance-Operate-Transfer
DBO	Design-Build-Operate
DCF	Deputy Conservator of Forests
DEA	Department of Economic Affairs, Ministry of Finance, Government of India
DF/R	Draft Final Report
DGCA	Director General of Civil Aviation
DGPS	Differential GPS
DPR	Detailed Project Report
DST	Department of Science and Technology
ECOCERT	Name of an organic certification body
ESG	Environment, Social, and Governance
EU	European Union
FD	Forest Department
FICCI	Federation of Indian Chambers of Commerce & Industry
FM	Forest Management
F/R	Final Report
FSC	Forest Stewardship Council
FSI	Forest Survey of India
FSSAI	Food Safety and Standards Authority of India
FTSE	Financial Times Stock Exchange

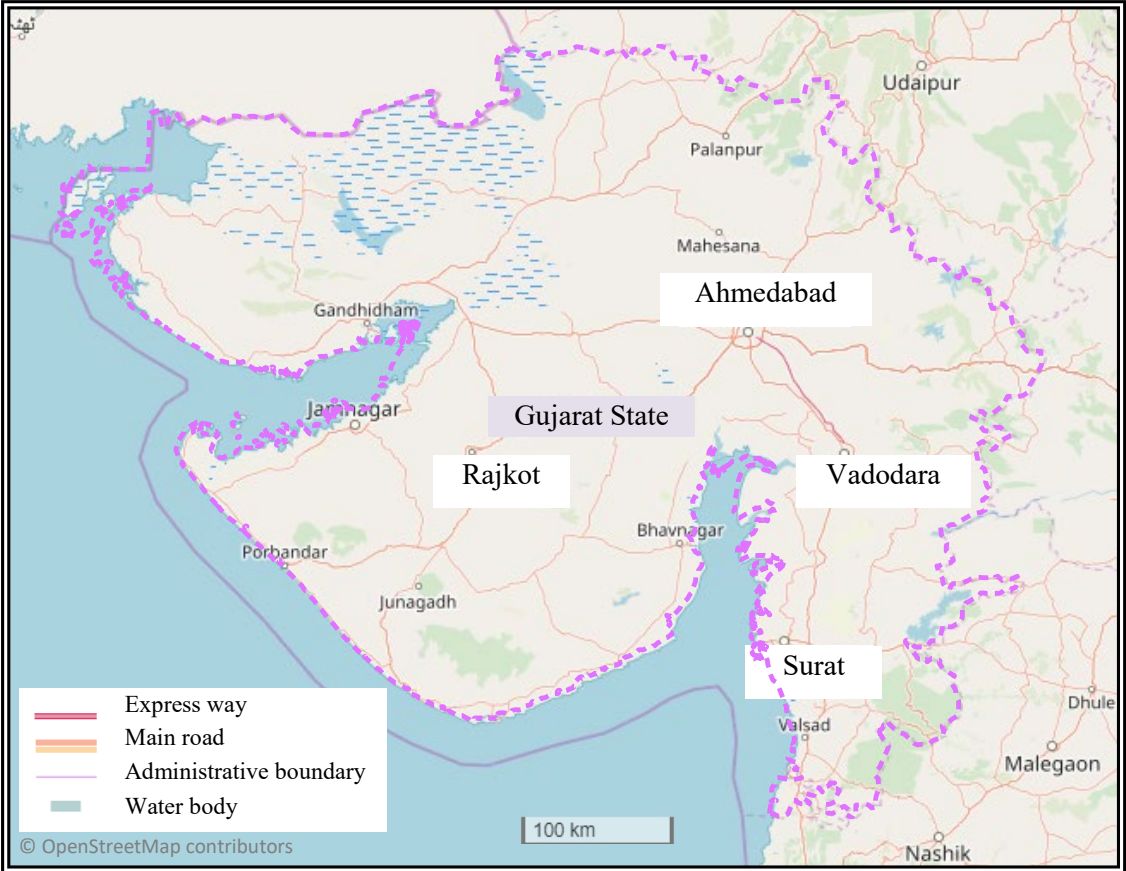
Abbreviation	English Name
FY	Financial Year
GAP	Good Agricultural Practice
GEC	Gujarat Ecology Commission
GEE	Google Earth Engine
GEER	Gujarat Ecological Education and Research (Foundation)
GeM	Government eMarketplace
GFD	Gujarat Forest Department
GFDC	Gujarat State Forest Development Corporation Ltd.
GFDP	Gujarat Forest Development Project
GFRF	Gujarat Forest Research Foundation
GIDB	Gujarat Infrastructure Development Board
GIPL	Guj Info Petro Ltd.
GIL	Gujarat Informatics Ltd.
GIS	Geographic Information System
GMDC	Gujarat Mineral Development Corporation Ltd.
GMO	Genetically Modified Organism
GMP	Good Manufacturing Practices
GOPCA	Gujarat Organic Producers Certification Agency
GSDC	Gujarat State Data Centre
GSLCS	Gujarat State Lion Conservation Society
GSPC	Gujarat State Petroleum Corporation
GSWAN	Gujarat State Wide Area Network
HACCP	Hazard Analysis & Critical Control Points
HOFF	Head of the Forest Force
IGA	Income Generation Activity
IIRS	Indian Space Research Organization
INDC	Intended National Determined Contribution
INR	Indian National Rupee
ISO	International Standard Organization
ISRO	India Space Research Organization
IT	Information Technology
IT/R	Interim Report
JAS	Japan Agricultural Standard
JETRO	Japan External Trade Organization
JFMC	Joint Forest Management Committee
JICA	Japan International Cooperation Agency
KVK	Krishi Vigyan Kendra (Agricultural Science Centre)
LISS	Linear Imaging Self-Scanning Sensor
LPG	Liquefied Petroleum Gas
MARG Education	A consulting firm
MCA	Ministry of Corporate Affairs
M&E	Monitoring and Evaluation
MFP	Minor Forest Produces
MGNREGA	Mahatma Gandhi Rural Employment Guarantee Act
MHA	Ministry of Home Affairs
MIS	Management Information System

Abbreviation	English Name
MoU	Memorandum of Understanding
MSCI	Morgan Stanley Capital International
MSP	Minimum Support Price
NCOF	National Center for Organic Farming, Government of India
NDI	National Design Institute
NGO	Non-Governmental Organization
NOP	National Organic Program of U.S.
NPL	National Physical Laboratory
NPOP	National Programme for Organic Production
NRSC	National Remote Sensing Centre
NTFP	Non-Timber Forest Produce
OECD	Organization for Economic Co-operation and Development
OEM	Original Equipment Manufacturer
OISCA	Organization for Industrial, Spiritual and Cultural Advancement-International (An international NGO; Headquarter in Japan)
O&M	Operation and Maintenance
PCCF	Principal Chief Conservator of Forests
PEFC	Programme for the Endorsement of Forest Certification
PGS	Participatory Guarantee System for India
PMC	Project Management Consultants
PMU	Project Management Unit
QCBS	Quality and Cost Based Selection
PPP	Public Private Partnership
PSU	Public Sector Undertaking
RESECO	Remote Sensing and Communication Centre
RFO	Range Forest Officer
RPA	Remotely Piloted Aircraft
RPAS	Remotely Piloted Aircraft Systems
RS	Remote Sensing
SDC	State Data Center
SDGs	Sustainable Development Goals
SEWA	Self Employed Women's Association (NGO based in Gujarat)
SHG	Self Help Group
SOP	Standard Operating Procedures
SPSU	State Public Sector Understanding
SPV	Special Purpose Vehicle
SSI-I	Sustainable Spices Initiative India
TERI	The Energy and Resources Institute
TNFD	Tamil Nadu Forest Department
TOR	Terms of Reference
TPM	Third Party Monitoring
TRIFED	The Tribal Cooperative Marketing Development Federation of India
TRO	Training, Research and Orientation
UAOP	Unmanned Aircraft Operator Permit
UAS	Unmanned Aircraft System
UAV	Unmanned Aerial Vehicle

Abbreviation	English Name
UIN	Unique Identification Number
UNESCO	United Nations Education, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Fund
UPFC	Uttar Pradesh Forest Cooperation Ltd.
UPL	United Phosphorus Ltd.
VCC	Visdalia Cluster Cooperative Society, Surat District
VHF	Very High Frequency (Wave)
WASH	Water, Sanitation and Hygiene
WB	World Bank
WPC	Wiress Planning and Coordination
WWF	World Wildlife Foundation

Project Target Area Map

Gujarat State



This map, based on a UN map, modified by JICA. The depiction and use of boundaries, geographic names and related data shown on map do not necessarily imply official endorsement or acceptance by JICA.

Chapter 1. Introduction

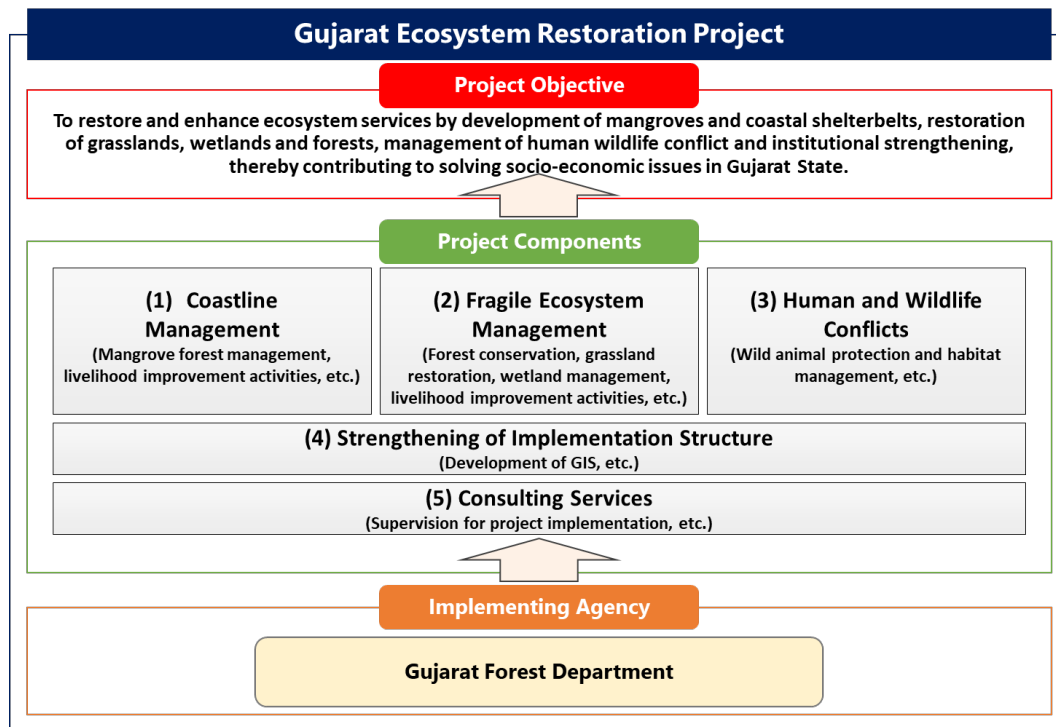
1.1. Background and Objectives

Gujarat State is located in western India and has an area of 196,024 km² (about half of the total area of Japan), equivalent to 6.19% of the total area of India. The state also has diverse ecosystems due to its geographical features, from its southern coast, including its 1,663-km-long coast line (the longest in India), to the inland region where dense forests grow. These ecosystems provide a wide range of ecosystem services to local residents. The services include watershed protection, soil runoff prevention, and windbreak forest in coastal areas, and the provision of natural resources to local residents. The state's ecosystem is also a habitat for various wild animals. The Gujarat Forest Department (GFD) implemented the Gujarat Afforestation and Development Project (GFDP I) from 1995 to 2004, and the Gujarat Forestry Development Project (GFDP II) from 2007 to 2017. In order to improve the forest coverage rate, the former project mainly carried out activities contributing to afforestation and forest restoration, and the latter mainly carried out participatory forest conservation activities and livelihood improvement activities, especially in forest lands. However, due to the increase in natural resource utilization caused by the rapid economic development and population increase of the state, the diverse ecosystems of the state have been degraded every year, increasing the risks of natural disasters developing and there being negative impacts on the economic activities of rural residents. In particular, there is a lack of disaster prevention measures and livelihood measures in the coastal areas and there has been an increase in human damage to wildlife due to a degraded ecosystem in inland grasslands and wetlands, which wild animals inhabit. The Government of India formulated the "Green India Mission" as a part of its national action plan and is working on the conservation of the country's ecosystem. Similarly, the Government of Gujarat formulated the "Sustainable Vision 2030" with the goal of conserving local ecosystems. Under these circumstances, in order to adapt the participatory approach developed in the previous projects to ecosystems other than forest lands and conserve the whole state ecosystem, the Government of India made a request for the "Project for Ecosystem Restoration in Gujarat" (the Project), which is a yen-loan-financed project focused on (1) Coastline Management, (2) Fragile Ecosystem Management, and (3) Human and Wildlife Conflicts.

This complementary preparatory study (the Study) was conducted based on the Detailed Project Report (DPR) prepared by the GFD with understanding of the request from the Government of India. Particularly for the Project components of Geographic Information System (GIS) and Private Partnership, the information necessary for the examination to be implemented as a Japan yen-loan-financed project — such as information on Project background and purpose, outline, Project cost, Project implementation structure, and the operation and maintenance management system — will be collected and analyzed. The Study will be carried out to complement the main study by the Indian national consultants selected by JICA India Office.

1.2. Overview about Outcomes

The outline of the yen-loan-financed project targeted by the Study is shown in Figure 1.1. According to the DPR, the main components for achieving the Project purpose are (1) coastline management, (2) fragile ecosystem management, (3) human and wildlife conflicts, (4) strengthening of the implementation structure, and (5) consulting services. The DPR also indicates that the Project will consist of a preparation phase (one year), an implementation phase (five years), and a consolidation phase (one year), and that the Project implementation period will be seven years in total.



Source: JICA Study Team (2019) based on DPR

Figure 1.1: Overview of the Project

1.3. Methodology and Approach

This final report (F/R) was prepared as a part of outputs from the Study as per literature reviews, including the DPR, meetings with the implementing agency and other relevant stakeholders, and field visits. During the first and second field survey periods, the following technical meetings and field visits were conducted.

1) Technical Meetings

- Kick off meeting: July 18, 2019

2) Field Visits

- Aravalli Forest Division: July 19, 2019
- Bharuch and Surat Forest Divisions: July 25 – July 26, 2019
- Vadodara Forest Division: July 25, 2019
- Lucknow City, Uttar Pradesh State: July 26, 2019
- Junagadh Forest Division: August 1 – August 3, 2019
- Surat and Chhota Udaipur Forest Divisions: August 1 – August 3, 2019
- Sabarkantha and Banaskantha Forest Divisions: September 23 – September 24, 2019
- Bharuch, Surat, and Vadodara Forest Divisions: September 23 – September 25, 2019
- Delhi City, September 30, 2019

3) Fact-Finding Mission

- The first fact-finding mission: September 30 – October 4, 2019

1.4. Report Structure

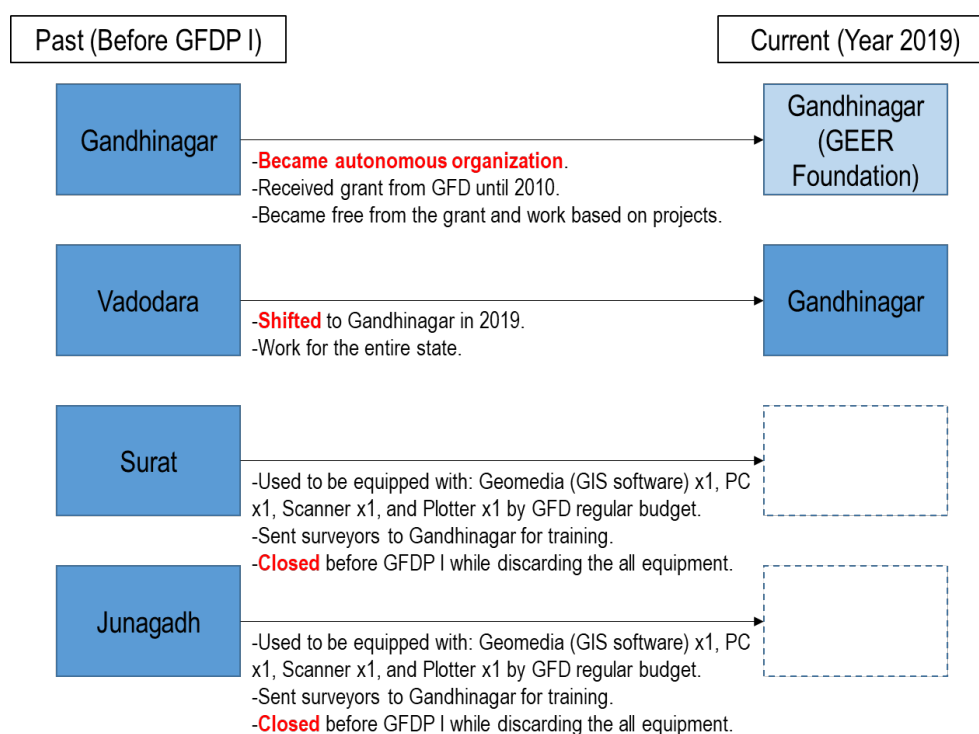
The F/R is structured in the following order: (1) examination of the present status in GIS and Private Partnership (Chapters 2 and 3), (2) review of the DPR (Chapter 4), (3) problem analysis (Chapter 5),

(4) proposal for a new project (Chapter 6), and (5) cost estimation for proposed project activities. More specifically, Chapters 2 and 3 present information about Gujarat State, focusing on GIS/MIS and CSR/Private Partnership, respectively. Chapter 4 reviews the DPR submitted by the GFD. Chapter 5 examines issues identified from the field surveys and the DPR. Chapter 6 discusses the output of the Project outline, as well as the detailed scope of work.

Chapter 2. Utilization Status of GIS and MIS in the GFD

2.1. GIS-Based Administrative Services, Implementation Structure, Staffing, and Equipment and the Use Status

The Gujarat Forest Department (GFD) has designated GIS Cells. The GFD initially had four GIS Cells or Centres under the Working Plan Wing: (1) Gandhinagar (Gujarat Ecological Education and Research (GEER) Foundation), (2) Vadodara, (3) Surat, and (4) Junagadh. Before GEER was established, a GIS Cell used to exist in Gandhinagar and consisted of one Deputy Conservator of Forests (DCF), two Assistant Conservators of Forests (ACF), one Surveyor, and one Senior Research Fellow. When GEER became an autonomous society, the GIS Cell also became its internal remote sensing (RS) and GIS section, with a training facility. Until 2010, the GEER GIS Unit received a grant from the GFD and worked exclusively for the GFD. Since 2010, however, the GEER GIS Unit has worked for different projects for not only the GFD but also other agencies. The Vadodara GIS Cell is currently being shifted to Gandhinagar. Although in the past the Vadodara GIS Cell had many operators to target the entire state, the current GIS Cell in Gandhinagar has two technical staff members, with one accountant under one ACF, and still targets the entire state. The GIS Centres in Surat and Junagadh used to be in operation with basic infrastructure, such as having one PC with GIS software, one plotter, and one scanner, which were procured by the GFD; further, their surveyors used to come to the GEER GIS Unit for training. These two offices had been closed before GFDP I started, and the equipment was discarded following the GFD's internal regulations. As a result, only the GIS Cell in Gandhinagar (GFD GIS Cell) and the RS and GIS section of the GEER Foundation (GEER GIS Section) are currently in operation (Figure 2.1).



Source: JICA Study Team (2019) based on interviews with the GFD and GEER

Figure 2.1: Historical Changes of GFD GIS Cells

Accordingly, in this section, the capacity of the GFD GIS Cell and GEER GIS Section is examined, focusing on (1) service content, (2) implementation structure and staffing, and (3) equipment and their use status. In addition, the GIS Lab in the Wildlife Division Sasan Gir (Sasan Gir GIS Lab) is also examined because of its potential to become a regional hub of GIS activities.

(1) Service Content

The GFD GIS Cell is responsible for various tasks, including the preparation of data required for forest management plans (e.g. administrative boundaries of circles, divisions, ranges, rounds, beats, and villages). During GFDP I and II, at the same time, management maps were digitized and thematic maps were prepared — such as forest cover maps, fire prone area maps, mangrove maps, grassland maps, and invasive species maps — while change detection for forest cover in target Joint Forest Management (JFM) villages was conducted. In addition to the thematic maps listed above, the GFD GIS Cell also produces maps for reports after GPS surveys. Only surveyors at division level can produce maps using GPS.

The GEER Foundation is an autonomous body established by the GFD in 1982. This foundation has been registered as a Society under the Indian Societies Registration Act, 1860, and as a Public Trust under the Bombay Public Trust Act of 1950. The main office of the GEER Foundation is located in Gandhinagar, with regional field stations in Surat, Bhavnagar, Jamnagar, Mangrol, and Mandvi¹. The GEER Foundation has an internal RS and GIS section to conduct field surveys and map making for various projects. For example, the GEER GIS Section completed mapping for the status of land use and land cover in Velavadar National Park and Dholera area, assessment of forest cover, using RS technology, in the catchment area of Sardar Sarovar Project, forest cover mapping of Bhavnagar Division, and habitat and vegetation density mapping of the Gir Protected Area². The GEER GIS Section is also responsible for the ongoing impact assessment of GFDP II, together with GFD GIS Cell. More specifically, the GEER GIS Section is responsible for assessing the periodical changes in tree cover in the forest area using RS technology and field data collection and analysis at sample plots in forest areas and grasslands as a part of monitoring and evaluation activities. This assessment was conducted three times (before the project was implemented, in the middle of the implementation phase, and after the project implementation was completed).

The Wildlife Division Sasan Gir conducts various unique activities. The main activities of the Wildlife Division Sasan Gir are conservation, protection, research, rescue, and release of wildlife. Besides these activities, this division is also engaged in activities for tourism, nature education, and awareness raising. Every five years, this division conducts a census of wildlife, including lions, leopards, and herbivores.

The Wildlife Division Sasan Gir has a GIS Lab at the office of the DCF. This GIS Lab was first established under the Gujarat State Lion Conservation Society (GSLCS) Junagadh and was upgraded as part of the Biodiversity Conservation and Rural Livelihood Improvement Project (BCRLIP)³. Using base data layers like administrative boundaries, rail and road networks, streams and rivers network provided from the India Space Research Organization (ISRO) and Bhaskaracharya Institute for Space Applications and Geo-Informatics (BISAG) as a reference, the GIS Lab creates data for such features as water points, rescue centres, checkpoints, wildlife sighting places, incident places, and corridors based on field data collected by beat guards and foresters using handheld GPS.

The Wildlife Division Sasan Gir also has a High-Tech Monitoring Centre for monitoring activities. This centre was established to manage information collected using radio collars, Very High Frequency Waves (VHF), GPS-enabled vehicles, and Closed Circuit Television (CCTV). It runs 24 hours a day. One range officer is posted there as the person responsible, and a combination of foresters and operators (outsourced staff) are posted there for day-to-day operation. This centre consists of two units, with each unit is comprised of two cells. The four total cells include: (1) a radio-collar monitoring centre, (2) radio telemetry monitoring centre, (3) vehicle tracking system, and (4) CCTV surveillance centre. The monitoring methods are summarized as follows.

¹ Interviews with the GEER Foundation

² <http://www.geerfoundation.gujarat.gov.in/gis.htm>

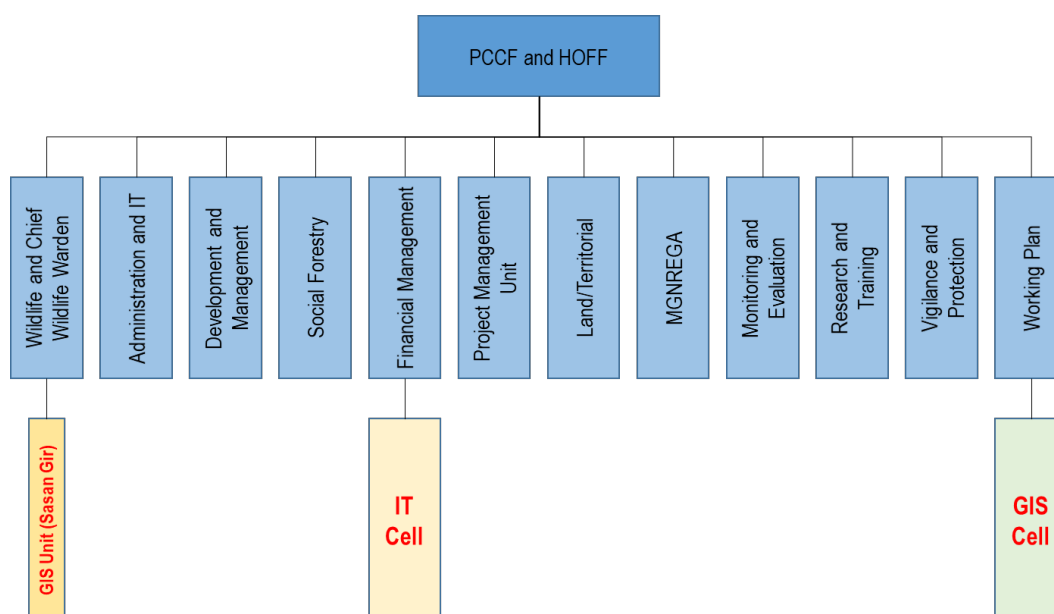
³ Interviews with DCF, Wildlife Division Sasan Gir

- Foot patrolling by beat guards within beat area (100% physical verification)
- Vehicle (motorbike) patrolling by foresters within rounds, a type of forest administrative boundaries (100% physical verification)
- Vehicle patrolling by officers such as Rangers/ACFs/DCFs (100% by Rangers, 20% by ACFs, and 5% by DCFs)
- Radio collar RS for wildlife
- Communication and staff movement tracking using walkie-talkies (VHF)
- Patrolling using GPS-enabled vehicles
- Monitoring using CCTV on all entry gates
- Patrolling with tablets for front line staff

For the radio collar monitoring centre, 75 radio collar units were installed for lions, and the movements of lions are tracked through the radio collars by iridium satellite. The collected data are visualized on high-resolution satellite imagery, and based on analysis results, messages are sent to field staff for actions as needed. Similarly, for the radio telemetry monitoring centre, 400 VHF sets were procured and distributed to key field staff, and 85 VHF sets were installed in vehicles for communication. Field staff and their vehicles are tracked by the locations of the VHF sets, and their movement patterns are displayed on maps at the centre.

(2) Current Implementation Structure and Staffing

The GFD GIS Cell belongs to the Working Plan Wing and, as of October 2019, has one ACF-rank officer, one accountant, and two contract-based GIS operators. These technical staff members have experience with different software and are involved in the above-mentioned services. At present, GFD regional offices, such as division and range offices, do not have GIS capacity. Figure 2.2 illustrates the relations between the GIS Cell and the entire the GFD, including the Sasan Gir GIS lab and GFD IT Cell, which will be discussed later.

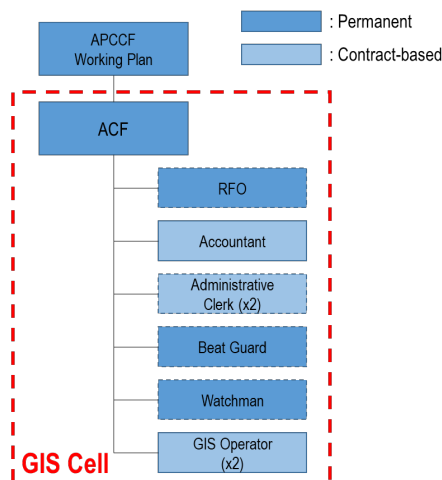


Source: JICA Study Team (2019)

Figure 2.2: Relations between the GIS Cell and the Entire GFD

Figure 2.3 illustrates the current staffing structure of the GFD GIS Cell. Under the Additional Principal Chief Conservator of Forests (APCCF) of the Working Plan Wing, it is staffed with one ACF, one accountant, and two contract-based technical operators, forming the GIS Cell. On the other hand, the positions of one Range Forest Officer (RFO), two administrative clerks, one beat guard, and one watchman are currently vacant. Technical training was provided to the GFD GIS Cell from

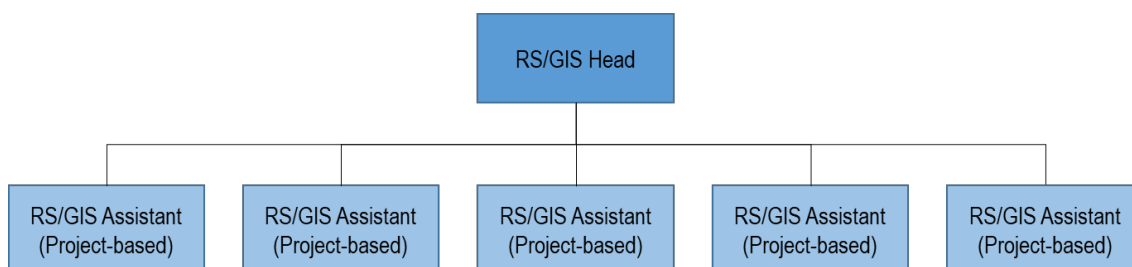
the ISRO and private agencies, and manuals were prepared in English and Gujarati. GIS operators are now able to conduct visual interpretation and semi-automatic classification work using RS techniques.



Source: JICA Study Team (2019)

Figure 2.3: Current Staffing Structure of the GFD GIS Cell

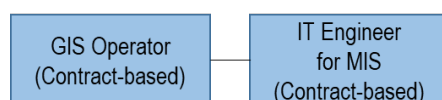
The GEER GIS Section consists of one senior research fellow (RS/GIS Head), who is responsible for the implementation and handling of different projects in the GIS and RS fields, and five RS/GIS Assistants. The RS/GIS Head has a relevant university degree and more than 20 years of work experience in the RS and GIS fields, and the RS/GIS assistants have 5 to 8 years of work experience as GIS technicians⁴. Figure 2.4 illustrates the current staffing structure of the GEER GIS Section.



Source: JICA Study Team (2019)

Figure 2.4: Current Staffing Structure of the GEER GIS Section

Regarding the Sasan Gir GIS Lab, two operators have been placed there: one is for GIS, and the other is for MIS (Figure 2.5). Both operators are employees from outside of the GFD, and the operator responsible for GIS received technical training at BISAG.



Source: JICA Study Team (2019)

Figure 2.5: Current Staffing Structure of the Sasan Gir GIS Lab

⁴ Interviews with the GEER Foundation.

(3) Equipment and Use Status

1) GIS Data Layers

The GFD GIS Cell has various GIS data layers, as shown in Table 2.1. As of July 2019, the forest administrative boundary data are being updated by BISAG. The GFD occasionally shares GIS data with other departments in a limited manner.

Table 2.1: GIS Data Layers Available in GFD GIS Cell

No.	Name	Purpose	Last updated
1	State boundary	• To examine the extent of Gujarat State	2017
Revenue administrative boundary			
2	District	• To show the extent of each district and examine its relation with forest areas	2017
3	Taluka	• To show the extent of each taluka and examine its relation with forest areas	2017
4	Village	• To show the extent of each village and examine its relation with forest areas	2017
Forest administrative boundary			
5	Circle	• To show the extent of each circle	
6	Division	• To examine administrative area managed by DFO	2017
7	Range	• To examine administrative area managed by Forest Ranger	2017
8	Round	• To examine administrative area managed by Forester	2017
9	Beat	• To examine small administrative area managed by Beat Guard	2017
10	Village	• To examine location and extent of villages and link with nearby forests	2017
11	Forest survey number	• To represent forest areas/plots with identification numbers • To be used in preparation of working plans and treatment maps	2017
12	Protected area boundary	• To examine location and extent of protected areas in the lion landscape area	Not confirmed.
13	Eco-sensitive zone boundary	• To examine location and extent of eco-sensitive zones in the lion landscape area	Not confirmed.
14	Reserved forest boundary	• To examine location and extent of reserve forests in the lion landscape area	Not confirmed.
15	Protected forest boundary	• To examine location and extent of protected forests in the lion landscape area	Not confirmed.
16	Railways	• To examine connectivity and accessibility by railway	2017
17	Roads	• To examine connectivity and accessibility by road	2017
18	River (Drainage)	• To examine drainage patterns	2017

Source: GFD GIS Cell

Table 2.2 shows the GIS data layers available at the GEER GIS Section.

Table 2.2: GIS Data Layers Available at the GEER RS and GIS Section

No.	Name	Purpose
Revenue administrative boundary		
1	District	• To be used for various projects in the entire state
2	Taluka	

No.	Name	Purpose
3	Village	
Forest administrative boundary		
4	Village	• To be used for Working Plan preparation in Reserved Forest area in Tribal Districts (western belt)
5	Range	
6	Compartment	
Sanctuary and National Park boundary		
7	Compartment	• To be used for various ecological study projects and to examine the status of forest cover in protected area
8	Village	
9	Protected area	

Source: Interviews with the GEER Foundation

GIS data layer available in the Sasan Gir GIS Lab are also summarized in Table 2.3.

Table 2.3: GIS Data Layers Available in the Sasan Gir GIS Lab

No.	Name	Purpose
1	Water points	<ul style="list-style-type: none"> Based on data collected by field staff members To be used for various activities in the lion landscape area
2	Rescue centres	
3	Checkpoints	
4	Wildlife sighting spots	
5	Incident places	
6	Corridors	

Source: Interviews with the Sasan Gir GIS Lab

2) Satellite Imagery

The GFD GIS Cell used various types of satellite imagery for different projects, as shown in Table 2.4. The GFD GIS Cell also purchases on demand satellite imagery from the National Remote Sensing Center (NRSC).

Table 2.4: Satellite Imagery Available at the GFD GIS Cell

No.	Sensor Type	Request Year	Request Date	Quantity (by scene)
1	LISS III	2010	December 1	3
2	LISS III		December 27	8
3	LISS III	2011	January 6	6
4	LISS III		June 12	13
5	LISS III	2012	February 7	1
6	LISS III		February 7	81
7	LISS III		February 14	11
8	LISS III		May 21	21
9	LISS III		August 31	3
10	LISS III		August 31	3
11	LISS III		October 25	2
12	LISS III		Unknown	12
13	LISS III		2013	June 13
14	LISS III	2014	July 11	54
15	LISS III		August 1	38
16	LISS III		August 1	55
17	LISS III		September 10	58
18	LISS III	2016	January 5	84
19	LISS III	2018	January 11	22

Source: GFD GIS Cell

Table 2.5 shows the major satellite imagery available in the GEER GIS Section. This indicates that the GFD purchased many data sets of satellite imagery for different projects.

Table 2.5: Satellite Imagery Available in the GEER GIS Section

No.	Imagery	Spatial Resolution	Coverage	Observation Year	Owner
1	Landsat	70m	Region	1982, 1984, 1986, and 1995	GFD
2	IRS 1A to 1D	30 and 70m	Region	1991 to 1995, 1999, 2000, and 2001	GFD
3	LISS-III	23.5m	Region	2000, 2001, 2002, and 2003	GFD
4			Region	2005	ISRO
5			State	2005	GFD
6			Region	2014	BCRLIP Society
7			Region	2009, 2012, and 2016	GFD (JICA)
8	LISS-IV	5.8m	Region	2001 to 2013	GMDC
9			Region	2015, 2016, and 2017	GFD
10			State	2018	GFD
11			State	2016-17	ISRO
12	Cartosat	2.5m	Region	2005, 2006, and 2009	GFD
13			Region	2001 to 2013	GMDC

Source: Interviews with the GEER Foundation

3) Maps

The GFD GIS Cell had various maps prepared for previous projects for the target working circles, divisions, and ranges, as shown in Table 2.6.

Table 2.6: Maps Available in GFD GIS Cell

No.	Project Name	Target Divisions	Year	Availability
1	Status of Forest Cover Mapping	Sabarkantha (N) and Sabarkantha (S)	2007	i) Division Level ii) Range Level
2	Status of Forest Cover Mapping (GFDP) Ex-Ante Period	Banaskantha, Sabarkantha (N), Sabarkantha (S), Dang (N), Dang (S), Baria, and Chhota Udaipur	2008	Same as above
3	GFDP Non-Forest Area Project	Vadodara, Banaskantha, Sabarkantha, Surat, Bharuch, Godhra, Narmada, Dahod, Navsari, and Valsad	2008	Same as above
4	Status of Forest Mapping Project (GFDP) Midterm Period	Banaskantha, Sabarkantha (N), Sabarkantha (S), Dang (N), Dang (S), Baria, and Chhotaudepur	2012	Same as above
5	GFDP Non Forest Area Project	Vadodara, Banaskantha, Sabarkantha, Surat, Bharuch, Godhra, Narmada, Dahod, Navsari, and Valsad	2012	Same as above
6	Bio-Diversity Project	Godhra and Baria	2011-12	Same as above
7	Fire Prone Area Mapping Project	Banaskantha, Sabarkantha (N), Sabarkantha (S), Dang (N), Dang (S), Baria, Chhota Udaipur, Vyara, Godhra, Mahisagar, Narmada, Bharuch, Gandhinagar, Junagadh, and Patan	2011-12, 2012-13, 2013-14, 2014-15, 2015-16	Same as above
8	Field Survey of Forest Resource (Herb, Shrub, Climber, Grasses and Bamboo)	Dang (N) and Dang (S)	2012-13	Same as above

No.	Project Name	Target Divisions	Year	Availability
9	Impact of JFMC of Forest Area of Gujarat State by Physical Survey	Surat, Rajpipala (W), Vyara, Dang (S), Dang (N), Valsad (S), Valsad (N), Vadodara, Chhota Udaipur, Godhra, Baria, Gandhinagar, Sabarkantha (N), Sabarkantha (S), Banaskantha, Gandhinagar, Ahmedabad, and Nadiyad	2012-13	Same as above
10	Impact of JFMC of Forest Area of Gujarat State by Using GIS and RS	Banaskantha, Sabarkantha, Gandhinagar, Kheda, Panchmahal, Dahod, Vadodara, Bharuch, Narmada, Surat, Tapi, Navsari, Dangs, and Valsad	2012-13	Same as above
11	Status of Forest Cover Mapping Project	Patan	2013	Same as above
12	Digital Flora of Gujarat Project	Entire Gujarat	2013-14	Same as above
13	Mapping of Shelter Belt along the Coastal Border of Gujarat State	Kachchh West, Kachchh East, Rajkot-Morvi, Jamnagar, Porbandar, Junagadh, Bhavnagar, Ahmedabad, Kheda, Bharuch, Surat, Valsad (N), and Valsad (S)	2013-14	Same as above
14	Thematic Mapping	Rajpipla (E), Rajpipla (W), Vyara, Valsad (N), Valsad (S), Banaskantha, Sabarkantha (N), Sabarkantha (S), Chhota Udaipur, and Gandhinagar	2013-14	Same as above
15	Mapping of Tree Present in Grass Land	Surendranagar and Jamnagar	2013-14	Same as above
16	Basemap Preparation of Gujarat Normal Division	All divisions	2013-14	Same as above
17	Evaluation Reason behind Change in the Forest Area under JFMC of Gujarat State	Valsad, Surat, Vadodara, and Gandhinagar Circles	2013-14	Same as above
18	Grassvidi Mapping Based on Density/Productivity	Jamnagar, Bhavnagar, Surendranagar, Rajkot, Junagadh, and Kachchh	2013-14, 2014-15	Same as above
19	Forest Cover Mapping and Working Circle-Wise Change Detection with Reference to Working Plan Period	Banaskantha, Dang (N), Dang (S), Patan, Bharuch, Surat, and Narmada	2014-15	i) Working Circle Level ii) Division Level iii) Range Level
20	Selection of Landscape and Operational Units in Gujarat State for 'Green India Mission'	Chhota Udaipur	2014-15	i) Division Level ii) Range Level
21	CAMPA Project	Bharuch Sub Division, Dang (N), Dang (S), Valsad (N), Valsad (S), Surat, Narmada, Vyara, Chhota Udaipur, Godhra, Bariya, Banaskantha, Sabarkantha, Sabarkantha (S), Gandhinagar, Jamnagar, Rajkot, Surendranagar, Bhavnagar, Junagadh,	2014-15	Same as above

No.	Project Name	Target Divisions	Year	Availability
		Porbandar, Patan, Kachchh East, and Kachchh West		
22	Socioeconomic Survey Project	Surendranagar and Patan	2016-17	Same as above
23	Forest Resource Survey Project	Surendranagar and Patan	2016-17	Same as above
24	Developing File of Grass Land Gujarat	Gir East, Gir West, Bhavnagar, Jamnagar, Junagadh, Porbandar, Rajkot, Surendranagar, Wild Ass Sanctuary, Godhra, Bariya, and Kachchh	2017	Same as above
25	Project of Road Network in Protected Forest	Bharuch, Surendranagar, Junagadh, and Patan	2017	Same as above
26	Project of Boundary Detection of Grass Land of All Normal forest division of Gujarat Forest Department	Baria, Godhra, Jamnagar, Junagadh, Surendranagar, Bhavnagar, and Rajkot	2017	Same as above
27	Project of Khasra/Patch No Wise Boundary Detection under FCA	Chhota Udaipur	2017	Same as above
28	Project of Study of Role of Rural Activities on the Occurrence of Forest Fire	Dang and Chotta Udaipur	2017	Same as above
29	Working Circle-Wise Forest Density Mapping and Change Detection and Thematic Map	Godhra, Baria, and Mahisagar	2017-18	Same as above
30	Management Plan for Fire Prone Zone at Godhara & Mahisagar Forest Division	Godhra and Mahisagar	2017-18	Same as above
31	Management Plan for Fire Prone Zone at Valsad North & Valsad South Forest Division	Valsad (N) and Valsad (S)	2017-18	Same as above
32	Management Map	1) Chhota Udaipur 2) Banaskantha 3) Bhavnagar 4) Gandhinagar 5) Junagadh 6) Navsari 7) Patan 8) Porbandar 9) Sabarkantha (N) 10) Sabarkantha (S) (Aravalli) 11) Surat 12) Surendranagar 13) Valsad 14) Bharuch	2018	Division Level & Depending on requirement of division

Source: GFD GIS Cell

Table 2.7 shows major maps available in the GEER GIS Section.

Table 2.7: Maps Available in the GEER GIS Section

No.	Type	Coverage	Features	Owner
1	Forest cover map	Region	<ul style="list-style-type: none"> • 1997, 1999, 2000, 2001, and 2004 • Includes: (1) Dense forest, (2) Open forest, (3) Degraded forest, and (4) Water 	GFD
2	Grass cover classification map	Region	<ul style="list-style-type: none"> • 2005 and 2008 • Includes: (1) Dense grass, (2) Open grass, 	GFD

No.	Type	Coverage	Features	Owner
			(3) Tree cover, and (4) Water	
3	Forest fire prone map	Region	<ul style="list-style-type: none"> • 2000, 2001, 2002, and 2003 • Includes: (1) Very high, (2) High, (3) Medium, and (4) Low 	GFD
4	Forest density map	Region	<ul style="list-style-type: none"> • 2004, 2009, and 2014 • Includes: (1) Dense forest, (2) Open forest, (3) Degraded forest, (4) Water 	GFRF
5	Forest cover map	Region	<ul style="list-style-type: none"> • 2009, 2012, and 2016 • Includes: (1) Very dense forest, (2) Moderate dense forest, (3) Open forest, (4) Degraded forest, and (5) Water 	GFD (JICA)
6	Vulture distribution map	State	<ul style="list-style-type: none"> • 2016 and 2018 • Includes: Sightings of vulture 	GFD
7	Land use/land cover & species distribution maps	Region	<ul style="list-style-type: none"> • 2011 • Includes: (1) Tree cover, (2) Herbaceous cover, (3) Mangrove cover, (4) Mudflat, (5) Agriculture land, (6) Settlement, and (7) Water body 	GIDB
8	Land use/land cover & species distribution maps	Region	<ul style="list-style-type: none"> • 2010 • Includes: (1) Mangrove cover, (2) Mudflats, (3) Scrubland, (4) Saltpan, (5) Agriculture land, (6) Industrial area, and (7) High/low tide line. 	WB and GEC

Source: Interviews with the GEER Foundation

4) Hardware

To implement field surveys and map making, the GFD GIS Cell has hardware and software as shown in Table 2.8. The GFD also provides field staff with hand-held GPS for conducting field surveys.

Table 2.8: Equipment Available in the GFD GIS Cell

No.	Item	Remarks	Quantity (Usable)	Quantity (Unusable)
1	Desktop PC		6 (old) + 20 (new)	24
2	Laptop PC		0	1
3	Printer	HP 5550 Laser Jet Color Printer for A3 Size	1	0
4	Scanner	For A0 Size	0	1
5	Scanner	For A4 Size	0	1
6	Plotter	For A0 Size	3	2
7	Xerox machine		1	0
8	Internet connection	5 desktop PC are connected with GSWAN.	1 set	0
9	Air condition		1	7
10	LCD projector		1	0
11	UPS		27	24
12	Digital camera		0	2
13	GPS		11	Not confirmed.
14	ERDAS Imagine	Ver. 9.2	1	0
15	ArcGIS	Ver. 10.1	2	Not confirmed.
16	IGIS	Ver. 10.1	6	0
17	MS Windows OS		2	0
18	MS Office		2	0

Source: GFD GIS Cell

Table 2.9 shows equipment available in the GEER GIS Section.

Table 2.9: Equipment Available in the GEER GIS Section

No.	Name	Descriptions	Quantity
1	Workstation	HP computer with Intel CPU Core i7, i5 @ 3.00GHz, RAM 8GB, Graphics 4/8 GB RAM, 1/2TB HDD, 32/64 bit, Windows 7/10 pro (Stand-alone)	6
2	Plotter	HP 42 inch 5200 design jet color plotter	1
3	Scanner	Contax HD Ultra 42 inch high resolution	2
4	GIS Software	ArcGIS 10.4	3
5	RS Software	ERDAS Imagine 2015	3
6	GPS	Garmin eTrex, GPSMAPS64S	12

Source: Interviews with the GEER Foundation

Table 2.10 shows equipment available at the Sasan Gir GIS Lab.

Table 2.10: Equipment Available at the Sasan Gir GIS Lab

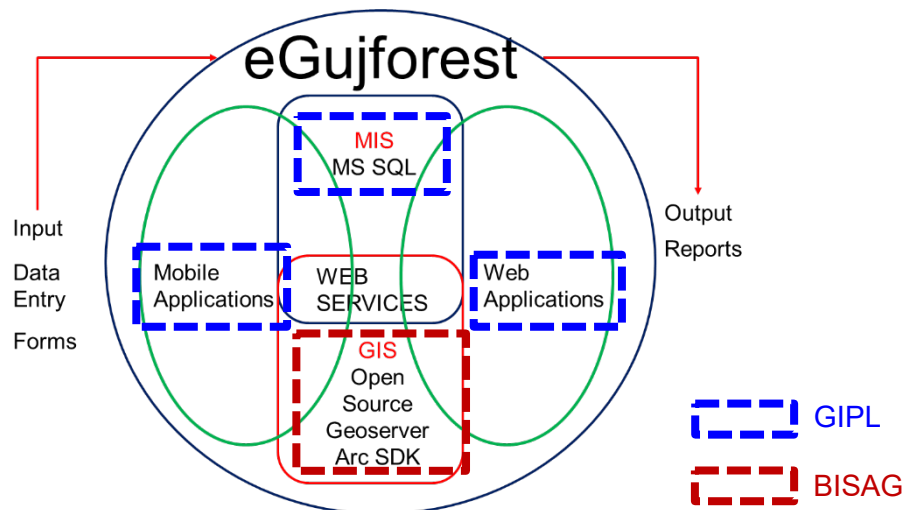
No.	Name	Descriptions	Quantity
1	Workstation	-	2
2	Printer	-	1
3	Plotter	-	1
4	Photocopier	-	1
5	Internet connectivity	GSWAN (5 MBPS)	1
6	Internet connectivity	BSNL (16 MBPS)	1
7	UPS	-	1
8	Generator	-	1

Source: Interviews with the Sasan Gir GIS Unit

In GFDP I and II, the GIS equipment necessary for the project interventions was procured. Some of the equipment is too old to be used today. At the same time, recently the Principal Chief Conservator of Forests (PCCF) of the GFD expressed the need to use open source software on a priority basis. In fact, open source software is currently used as a base platform for the GFD, and all of the MIS and GIS applications of eGujForest have been shifted from commercial software to open source software.

2.2. GIS-Based Services and Activities in Relevant Agencies

The GFD GIS Cell has closely collaborated with two relevant agencies, namely Gujarat Info Petro Limited (GIPL) and Bhaskaracharya Institute for Space Applications and Geo-Informatics (BISAG), for the development of an MIS system named eGujForest, the application structure of which is based on GIS, MIS, and Mobile. In this development work, GIPL has been engaged in the development of MIS modules including mobile applications, while BISAG is responsible for GIS integration of the same system (Figure 2.6).



Source: GFD IT Cell

Figure 2.6: Overview of eGujForest and Division of Roles between GFD, GIPL, and BISAG

(1) GIPL

GIPL is a government company or Public Sector Undertaking (PSU) of Gujarat State Petroleum Corporation (GSPC) under the Department of Energy and Petroleum. GIPL was established in 2001 and currently has a total of about 120 staff members, including 60 software development engineers. To date, GIPL has worked for 15 Gujarat state departments, including the GFD.

GIPL has been responsible for software development for the GFD's information system for decision-making as well as efficient internal information sharing, eGujForest, since 2010. Two major tasks were given to GIPL, to be done in two phases: (1) MIS development and (2) mobile application development. Phase 1 was from 2010 to 2013 and Phase 2 was from 2014 to 2016. The GFD has an Annual Maintenance Contract (AMC) with GIPL to maintain the applications, and both phases are currently covered by this AMC.

(2) BISAG

BISAG was established in 1997 by the Government of Gujarat as a state-level nodal agency that facilitates the use of spatial technology for planning and developmental activities. BISAG was earlier known as the Remote Sensing and Communication Centre (RESECO); it was renamed BISAG in December 2003⁵. BISAG has five core wings, namely (1) SATCOM Network⁶, (2) GIS, (3) Software Development, (4) Research, and (5) Academic. It is certified as a Capability Maturity Model Integration (CMMI) Level 5 organization for the systematic software development process. BISAG has approximately 500 regular staff members, including 450 scientists and engineers. BISAG also allows students to do their own research work. Currently, 600 to 700 students from different colleges and universities are also working as interns while doing their research work.

BISAG is responsible for the update of the master data for administrative and forest boundaries. Requests come directly from GFD division and range offices about two or three times a week. BISAG has been also involved in Web GIS development for the merging of GIS and MIS in eGujForest. Although a private GIS development company was previously engaged for the GFD, as a result of the GFD's new policy of using open source software on a priority basis, the GIS system was entirely

⁵ <https://bisag.gujarat.gov.in/>

⁶ SATCOM Network is a satellite communication network service consisting of a subsidiary network of various educational institutions, government departments, voluntary agencies, etc., to facilitate easier and faster distant interaction in the developmental and educational activities of the state. (Source: <https://bisag.gujarat.gov.in/gujarat-satcom-network>)

renewed by BISAG, and the agency has remained involved in the development work since then.

2.3. Review of Existing Monitoring Systems and their Methods

2.3.1. Overview of eGujForest

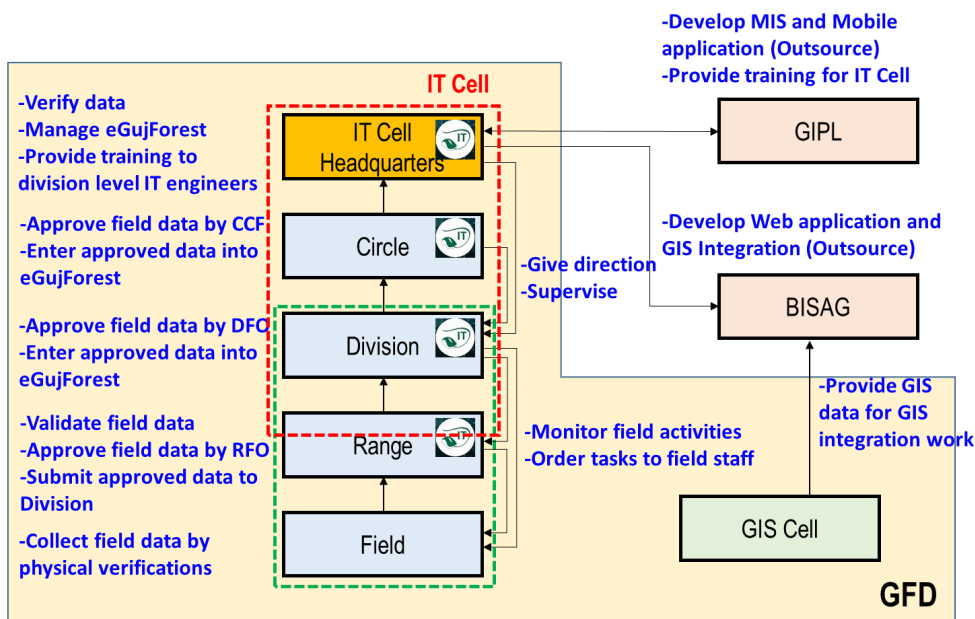
As noted above, the GFD developed an MIS application called “eGujForest” with help from GIPL. The application is hosted in the server at the State Data Centre (SDC) and is accessed through Gujarat State Wide Area Network (GSWAN) connectivity, which is a closed network. The application currently has several modules. The application supports access right defined by the GFD, and only designated users can access the specific data in the system.

The eGujForest has a mobile version where some features of the main applications are customised on the Android platform and can be installed on tablets or Android devices. The Wildlife and Offence modules of eGujForest were developed for the Junagadh lion landscape area; recently, the GFD distributed tablets with this application to the field staff in this area as a pilot project. The eGujForest also has an SMS alert system that informs field surveyors of urgent incidents. This system also monitors active users and live location of devices through the PDA Summary Report module.

(1) GFD IT Cell

The Information Technology Cell of the GFD (GFD IT Cell) was set up in 2012 in order to operate and maintain eGujForest. One APCCF and one assistant director of IT have been posted to this cell. Under the GFD IT Cell, 75 IT Engineers are engaged at different levels of the GFD including at headquarters and the offices of circles and divisions, and four of them are posted at the IT Cell in headquarters. The GFD IT Cell arranges the internet connection for field offices. To date, all circles and divisions, and some range offices, have been connected through GSWAN connectivity provided by the Department of Science and Technology (DST). The Government of Gujarat and the GFD approved the procurement of 2,000 tablets as proposed by the GFD IT Cell. Out of all of the proposed 2,000 tablets, 1,200 have been procured to date. Out of the 1,200 procured tablets, 800 have been distributed to field offices in the lion landscape circles, namely Junagadh, Junagadh Wildlife, and Rajkot. The remaining 400 tablets are still reserved for newly formed divisions or emergent requirements.

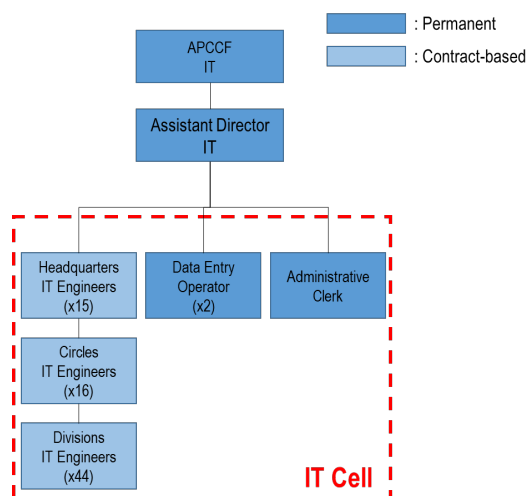
Within the GFD IT Cell, each office has different roles and responsibilities, and the entire workflow can be divided into two parts. First, field officers collect data by physical verification, and the collected data are validated and then approved by the RFO. The approved data are then submitted on paper to division offices. The Division Forest Officer (DFO) at division offices checks and approves the submitted field data, and once approved, IT Engineers enter the field data into eGujForest. Division offices are also responsible for monitoring field activities and order field staff to do tasks as needed. Second, circle offices approve the submitted data from circle and division offices and enter necessary information into eGujForest. Sometimes, circles supervise and give directions to division offices. After it has been approved by the circle offices, headquarters verifies and manages the data in eGujForest. Headquarters also supervises and gives directions to divisions when necessary. Training about eGujForest was provided by GIPL for IT Engineers at headquarters, after which these IT engineers further provided training to designated IT Engineers in local offices. At the same time, headquarters is also responsible for subcontracting development work to GIPL and BISAG. Figure 2.7 illustrates the overall operation of eGujForest and different roles and responsibilities. In this figure, the first part is shown in the green square, while the second is shown in the red square.



Source: JICA Study Team (2019)

Figure 2.7: Overall Operation of eGujForest and Different Roles and Responsibilities

Figure 2.8 further shows the staffing structure of GFD IT Cell.



Source: JICA Study Team (2019)

Figure 2.8: Current Staffing Structure of the GFD IT Cell

To operate and maintain eGujForest, IT Engineers hired by the GFD are placed at division offices and ensure that data is entered into the MIS application. The GFD hired a total of 75 IT Engineers from a local service provider (Table 2.11).

Table 2.11: The Number of Offices and IT Engineers for eGujForest

Office Level	No. of Offices	No. of IT Engineers
Headquarters ⁷	17	15

⁷ Headquarters is comprised of the following working branches/offices: (1) Administrative Branch, (2) Vigilance Branch, (3) Financial Management Branch, (4) Land Branch, (5) Legal Branch, (6) Project Management Unit (PMU) Branch, (7)

Office Level	No. of Offices	No. of IT Engineers
Circles	19	16
Divisions	69	44
Ranges	459	0
Rounds	1,920	0
Beats	3,817	0

Source: GFD IT Cell

The GFD procured the hardware and software necessary for establishing the IT Cell. Table 2.12 shows the equipment available in the GFD IT Cell.

Table 2.12: Equipment Available in GFD IT Cell

No.	Name	Descriptions	Quantity
1	Workstation	Intel Core i5 processor, 2.90 GHz, RAM 4GB, 1TB HDD, Windows 10 Pro, 64 Bit	7
		Intel Core i5, processor, 3.20 GHz, RAM 4GB, 1TB HDD, Windows 10 Pro, 64 Bit	1
		Desktop/Acer Intel Core i3, 3.70 GHz, 41GB	2
2	Server	Application server (1TB)	1
		GIS server (3TB)	1
		Communication server (2TB)	1
		Database server (2TB)	1
3	Scanner	Canon Image Formula D12-F120	1
		HP Scanjet Pro 2500F1	1
4	Internet	Headquarters	14
		Circles or below	358
5	Tablets	Acer One 7 4G, purchased in 2019, and distributed to Forest staff of Junagadh Wildlife, Junagadh, and Rajkot Social Forestry Circles	1,200

Source: Interviews with the GFD IT Cell.

(2) Modules Available in eGujForest

At present, eGujForest is comprised of a total of 21 main modules for different purposes. These existing modules are also modified based on GFD's needs. For example, new report formats (Details Report with Work Type & Work Year Type and Work Year Type wise Report) were added to the existing Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) module after use of this module had started. All MIS modules and sub-modules presently available in eGujForest and their main purposes are summarized in Annexure 2.1.

(3) eServices Applications

The GFD provides some services directly to the public. These services can be accessed by visiting the GFD website. Several applications were developed for further tracking. They include: (1) Farm land, (2) Kissan nursery, (3) Smashaan sagadi, (4) Cattle compensation, (5) Film shooting/photography permission, (6) Research permission, (7) Parapet wall around open wells, and (8) Sawmill licenses renewal. The requests received offline or online are processed through eGujForest for the timely delivery of services. The contents of each application is described in Annexure 2.2.

2.3.2. Monitoring Plantations by Physical Verification

To primarily increase the forest and tree cover of the state, the GFD implements monitoring for

Gandhinagar Wildlife Circle Office, (8) Wildlife Branch, (9) Social Forestry Branch, (10) Development & Management Branch, (11) Protection Branch, (12) MGNREGA Branch, (13) Monitoring & Evaluation Branch, (14) Working Plan Branch, (15) IT Cell, (16) GIS Cell, and (17) Publicity, Liaison Division Office.

plantations, and in accordance with the working plans and/or management plans, field staff periodically patrol target plantations. While tree plantation is commonly practiced in some areas, grass plantation is also conducted in other areas. Some plantations aim to create landscapes to mitigate the risks of human and wildlife animal conflicts. Monitoring activities are conducted up to five years. Three major methods are applied: (1) physical verification, (2) random sampling monitoring, and (3) Third Party Monitoring (TPM). For physical verification, GFD staff check all trees/plants at target sites every November and examine their survival rates, which are calculated by dividing the number of survived trees/plants by the total number of planted trees/species. Though field staff use GPS to survey plantation sites and prepare layout maps using satellite imagery on Google Maps, the GFD overall has not used GIS for monitoring and evaluation activities.

2.4. Communication Infrastructure for GIS and Tablet-Based Monitoring

Communication infrastructure plays a vital role in introducing GIS and tablet-based monitoring. At present, in comparison with range offices, division offices are better equipped with IT infrastructure to conduct monitoring activities. Figure 2.9 shows typical division and range office buildings and their IT supplies.



Source: JICA Study Team (2019)

Figure 2.9: Typical Division (Top) and Range (Bottom) Office Buildings and IT Supplies

To date, GSWAN, an intra-network developed by the Government of Gujarat, has covered the majority of division offices and some range offices in order to operate and maintain eGujForest. Table 2.13 shows current GSWAN connectivity in headquarters, circle, division, and range offices. Although there is still room for improvement by extending the coverage to the remaining range offices, the communication infrastructure designated for eGujForest has already been largely developed. The GFD has planned not only to increase the number of GSWAN connectivity locations, but also to provide new bandwidth to remaining locations and increase bandwidth at existing locations.

Table 2.13: Status of GSWAN Connectivity in Different Offices as of July 2019

Status	Head-quarters	Circle	Division	Range	Total
Connected	14	15	56	287	372
Not connected (pending)	0	3	6	86	95

Status	Head-quarters	Circle	Division	Range	Total
connectivity)					
Connected but not working	1	2	5	39	47
Shifting/new office	0	0	1	7	8
Total	15	20	68	419	522

Source: GFD IT Cell

At the same time, mobile applications require good internet conditions. While GFD offices, including the headquarters and circle, division, and range offices, are mostly covered by the existing internet network coverage, except for those located in hilly areas (e.g. Shyamlaji Wildlife Range), the internet is mostly unavailable in remote areas where mobile applications are usually used. At present, data are temporarily saved in the internal databases of Android mobile operating systems when offline. For those who are not familiar with tablets, walkie-talkies are still used in regular patrolling.

2.5. Other Information Relevant to GIS and MIS

(1) IT Action Plan

The GFD is now preparing an IT Action Plan as a roadmap over the next three years. Because the time periods of this plan and the Project implementation overlap, this plan will become a good reference for the Project.

(2) Case Example of RS and GIS Utilization in the State

The Directorate of Agriculture in Gujarat utilizes a monitoring system based on satellite RS in order to monitor specific types of crops and estimate their area and growth conditions, based on which the amount due for insurance is determined. This also contributes to the improvement of the quality of estimation. This system targets private lands outside of forest boundaries. The assessment results are summarized by village and crop type, and the results are also displayed on internal Web GIS. To ensure accuracy, the results are cross-checked with ground survey results. The analysis results are further validated by the technical committee prior to submission to the state government.

The work for the development and operation of this system was entirely outsourced to a private company. During the Project period, high-resolution satellite imagery for the entire state was periodically purchased, and spatial analysis such as classification of crops and estimation of the crop yield were conducted. In this regard, the Directorate signed an annual contract to acquire timely high-spatial resolution satellite imagery, and this contract also made it possible for the Directorate to easily prepare a budget. All relevant data were stored and managed in a geospatial information platform. Though their analysis objects are different from the Project, after necessary modifications as well as agreement between key stakeholders, the Project may refer to these analysis techniques and methods through the developed platform for the GFD's existing system.

2.6. Summary

(1) Current Limitation and Challenges

1) Lack of Appropriate Datasets and Maps

The Study found that the GFD implemented many projects in the past and that various data sets and maps still exist. However, because these data sets and maps were prepared for specific themes and regions in specific time periods and have already become outdated, they cannot be used for the Project. In this regard, the GFD needs to procure new data sets and then prepare recent maps within a short time period prior to the Project interventions.

At the same time, the GFD does not have GIS capacity in local offices, and all necessary data and maps are currently prepared by the GFD GIS Cell or BISAG. As a result, local officers cannot flexibly prepare and use maps for timely decision making. For mangrove plantations, local offices also rely

on the GEER Foundation for map preparation. As a result, the GFD cannot implement timely data analysis in a strategic manner.

2) Lack of Effective Monitoring Structure

The Study found that although the monitoring using eGujForest is in operation and functions, the data availability is still limited, and redundant work still exists within the monitoring structure. For example, spatial information is not obtained in a timely manner, and as a result, observation and analysis tend to get delayed. At the same time, detailed spatial data on target sites are not available, and the majority of work still relies on physical verification. Further, the existing eGujForest does not cover range offices that play an important role in the monitoring structure, and a large amount of work between division and range offices is still conducted on a paper basis despite the fact that many range offices have already been covered by GSWAN.

3) Shortage of Qualified Manpower

The Study also revealed that the human resources of the GFD, including of the headquarters and local offices, are limited; most of the required work is currently outsourced. For example, while the GFD GIS Cell is responsible for making GIS data, such as forest boundary data, used for working plans and management plans, updating the boundary data is outsourced to BISAG. In addition to the data update, all development work is outsourced to GIPL and BISAG. This situation makes it difficult for the Project to flexibly make maps in the future. For MIS, although the qualified IT Engineers are hired for the operation and maintenance of eGujForest, they are hired on short-term contracts, and it is possible that they will leave the GFD after the current contracts have ended. As a result, knowledge and skills are not sufficiently transferred to existing government officers, and the GFD will need to continuously depend on contractors for system operation and maintenance.

Moreover, although the DPR proposed the utilization of drones for various activities such as drone-based monitoring, patrolling for illegal activities, and human and wildlife animal conflicts, the in-house capacity of the GFD would not be able to manage drone-based activities because drone-based surveys and the related data processing require a lot of specialized knowledge and skills. For this reason, it may be necessary to narrow down the scope of drone-based activities and involve private agencies as subcontractors, especially in the early stage of the Project.

(2) Rooms for Improvement

1) Effective Use of Outsourcing

Although a large amount of work is expected in the Project, it is unlikely that new government officers or depute existing government officers will be hired for the Project Management Unit (PMU). Under these circumstances, it is difficult to complete the required preparation work in a timely manner. To address the shortage of qualified technical officers, a group of technicians can be temporarily placed in the GFD to efficiently produce various maps. This will make it possible not only to complete the large amount of work in a timely manner, but also to transfer technical knowledge and skills from hired experts to the GFD through the actual work.

2) Cloud-Based Data Processing and Analysis

Cloud-based, open source geospatial data analysis platforms can be introduced to fill a gap in the human resources of the GFD. For example, Google Earth Engine can allow users access to all work, which ranges from data searches, data processing and analysis to the display of analysis results, and can be conducted on cloud server. The use of cloud service and open source data will reduce a large amount of time and effort for the GFD and further improve their overall capacity.

3) Introduction of Drone-Based Activities

Monitoring and evaluation activities are still conducted largely by physical verification. GIS can make it possible to implement monitoring and evaluation activities systematically. Especially, drones

can produce additional reference information for the preparation of monitoring and evaluation activities for the plantation sites.

4) Expansion of MIS Operation Flow

For the operation of eGujForest, division offices currently play an important role, as a junction between eGujForest operation and field data collection. Especially between ranges and divisions, paper-based data flow exists at present. It is possible to expand the coverage of eGujForest operation down to range offices in accordance with the availability of GSWAN connectivity.

Chapter 3. CSR/Private Partnership in the State

3.1. Policies and Laws Concerning CSR/Private Partnership

Since the eleventh five-year Development Plan in 2007, India has aimed at achieving inclusive and sustainable economic development. In an attempt to call for engagement in this effort from the private sector, the “National Voluntary Guidelines on Social, Environmental and Economic Responsibilities of Business (2011)” and “Business Responsibility Reporting (2012)” were published. Subsequently, Corporate Social Responsibility (CSR), as a mandatory social contribution by private firms, was included as a section in the Companies Act 2013, which was effectuated on April 1, 2014.

3.1.1. National Framework for CSR

(1) National Voluntary Guidelines on Social Environmental and Economic Responsibilities of Business (2011)

These guidelines were published by the Ministry of Corporate Affairs (MCA) and are comprised of the following nine principles. The business shall:

- Conduct and govern themselves with ethics, transparency and accountability
- Provide goods and services that are safe and that contribute to sustainability throughout their life cycle
- Promote the well-being of all employees
- Respect the interests of, and be responsive towards all stakeholders, especially those who are disadvantaged, vulnerable and marginalised
- Respect and promote human rights
- Protect and make efforts to restore the environment
- When engaged in influencing public and regulatory policy, they should do so in a responsible manner
- Support inclusive growth and equitable development
- Engage with and provide value to their customers and consumers in a responsible manner

Source: The National Voluntary Guidelines, Ministry of Corporate Affairs (2011).⁸

The underlying concept of the guidelines is that inclusive and responsible business conduct will lead to innovation and thus, in the long run, the business will be sustained.

(2) CSR in the Companies Act 2013

“The National Voluntary Guidelines on Social, Environmental and Economic Responsibilities of Business” provided a basis for Section 135 of the Company’s Act 2013, in which a framework for the actions to be considered by private firms as CSR contributions was stipulated. The synopsis is given in the table below.

Table 3.1: CSR Defined in the Companies Act 2013

Scale of Business of Company Liable to CSR	CSR Spending	Area of CSR Activities
1) Net worth of 5 billion INR or more 2) Turnover of 10 billion INR or	Every financial year Minimum of 2% of the average	As per the Schedule VII of Companies Act*

⁸ <https://www.csr.gov.in/page-history.php>

Scale of Business of Company Liable to CSR	CSR Spending	Area of CSR Activities
more 3) Net profit of 50 million INR or more during any financial year	net profits of the company in the three immediately preceding financial years	

*Schedule VII of the Companies Act indicates focus areas to be considered under the CSR of the companies. The areas include: poverty and hunger; education, gender equality and women empowerment; child and maternal health; eradication of HIV/AIDS/malaria and other diseases; environmental sustainability; vocational training; promotion of social business; contribution to Prime Minister's National Relief Fund or any other fund set by the central and state government for the benefit of SC/ST/OBC/minorities and women.

Source: The Companies Act 2013, Government of India.

As mentioned above, the focal activities to be investigated under CSR draw attention to the marginalized population of the society; they also overlap with the United Nations Development Programme's Sustainable Development Goals (SDGs).

Further to clarify CSR defined in the Companies Act 2013, the Companies (CSR Policy) Rules, 2014 was issued. The Rules provides the definition of foreign entities and reporting formats on CSR projects. Firms are also required to record the reasons for cases in which the planned amount of money could not be spent; the amount unspent should also be recorded in the Board of Director's Report on the firm.

3.2. Overview of the Status of CSR: National and State Context

3.2.1. CSR in India

(1) Overview

Since the effectuation of the Companies Act 2013 and subsequent Companies Rule 2014, a cumulative amount of 525 billion INR has been spent on CSR activities by 74,272 companies⁹.

Table 3.2: Overview of CSR Projects in India

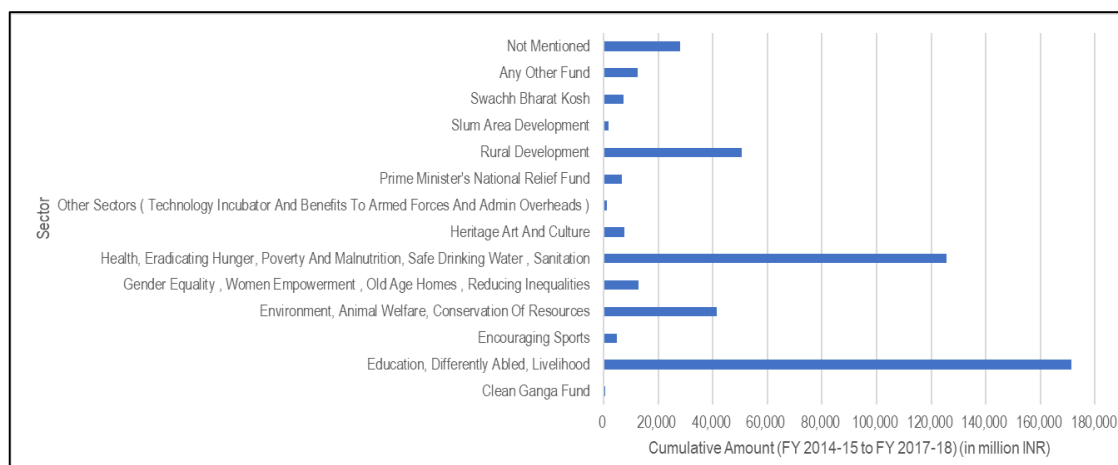
Particulars	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	Total
No of Companies	16,548	18,290	19,539	21,397	75,774
Total Amount Spent (in billion INR)	101	145	143	136	525
Total No of CSR Projects	9,352	18,423	23,008	23,489	74,272

Source: National CSR Portal, CSR Cell, Ministry of Corporate Affairs. (<https://www.csr.gov.in/index18.php>) accessed on October 12, 2019

(2) Development Sector Wise Spending

The development sector wise spending trend is more or less similar in the past four financial years. The highest amount was spent on the sector of 'Education, Differently Abled, Livelihood' (41.7% of the cumulative total), followed by the sector of 'Health, Eradicating Hunger, Poverty and Malnutrition, Safe Drinking Water, Sanitation' (21.2% of the cumulative total) and the sector of 'Rural Development' (12.7% of the cumulative total).

⁹ Source: National CSR Portal, CSR Cell, Ministry of Corporate Affairs. (<https://www.csr.gov.in/index18.php>) accessed on October 12, 2019.



Source: National CSR Portal, CSR Cell, Ministry of Corporate Affairs. (<https://www.csr.gov.in/index18.php>) accessed on October 12, 2019.

Figure 3.1: Development Sector Wise Cumulative Spending (FY2014-15 to FY 2017-18)

(3) CSR Investment by the Top Ten Companies

The contribution by the companies ranked among the top ten in CSR investment accounts for nearly 40% of the consolidated CSR spending by all companies. Reliance Industries Limited has maintained the top position on the list every year. Oil and Natural Gas Cooperation, TATA Consultancy Services Limited, NTPC Limited, and Infosys are also among the top contributors. In FY 2017-18, Reliance Industries CSR spending was 7.5 billion INR, which was far higher than that of the second ranked Oil and Natural Gas Corporation (4.8 billion INR). The list of the top ten companies, along with the amount of CSR spending, is given in Annexure 3.1.

Table 3.3: Status of CSR Investment by the Ten Highest CSR Spending Companies

Particulars	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	Cumulative Total
Total Amount Spent by Companies (in billion INR)	101	145	142	84	472
Spending by the top ten companies (in billion INR)	39.7	46.4	47.7	42.1	176
% share	39.4%	31.9%	33.5%	50.3%	37.3%

Source: National CSR Portal, CSR Cell, Ministry of Corporate Affairs. (<https://www.csr.gov.in/index16.php>) accessed on October 12, 2019.

(4) CSR Spending by States

In the state wise cumulative CSR spending, Maharashtra had the highest amount owing to the contribution of Reliance Industries Limited. In FY 2017-18, Maharashtra, Karnataka and Gujarat were the top three states in CSR spending. The list of major contributing companies and actual spending are given in the table below.

Table 3.4: CSR Spending in Maharashtra, Karnataka and Gujarat and Major Contributors

Maharashtra		Karnataka		Gujarat	
Company	CSR spending (in million INR)	Company	CSR spending (in million INR)	Company	CSR spending (in million INR)
Reliance	4,268	Infosys Limited	2,250	Indian Oil	713

Maharashtra		Karnataka		Gujarat	
Industries Limited				Corporation Limited	
Oil and Natural Gas Corporation Limited	1,000	Wipro Limited	1,691	Cadila Healthcare Limited	260
Bajaj Auto Limited	590	Toyota Kirloskar Motor Private Limited	182	HDB Financial Services Limited	231
Serum Institute of India Private Limited	484	Bosch Limited	147	Pidilite Industries Limited	220
JSW Steel Limited	310	Bharat Electronics Limited	133	Torrent Pharmaceuticals Limited	212

Source: National CSR Portal, CSR Cell, Ministry of Corporate Affairs (<https://www.csr.gov.in/index18.php>) accessed on October 12, 2019.

(5) Implementation of CSR Activities¹⁰

Companies implement CSR activities through: 1) direct implementation; 2) the corporate's own foundation; 3) implementation agencies (i.e. NGOs); and 4) a combination of all three preceding types. NGOs are often involved, especially in CSR projects implemented in remote areas and when implementing interventions requires community participation.

While implementing CSR projects, corporate houses face various challenges. In the "India CSR Report 2019", following points are reported:

- Insufficient understanding of the local context leading to an ineffective project plan and irrelevant indicators
- CSR fund annual fluctuation hampers long-term plans
- Lack of capacity of implementing partner
- CSR projects not contributing to government priorities
- Scarcity of data on CSR projects, making it difficult to understand the nature of CSR
- Local community seeing CSR as a give away, while companies attempting to enhance their capacity to sustain themselves
- Disparities in geography: where many larger/well-performing companies are located, more CSR interventions are implemented.
- Political pressure
- NGOs unable to provide the technical services for the CSR projects and lacking capacity to report the outputs and outcome.
- Small and Medium Enterprises unable to make meaningful contributions through CSR due to the volatility of CSR fund availability

3.2.2. CSR in Gujarat

(1) Gujarat CSR Authority and its Policy

After the effectuation of the Companies Act 2013, the Industries and Mines Department of Gujarat

¹⁰ This section is based on the Srinivasan, Girija & Srinivasan, Narasimhan. (2019). India CSR Report 2019. Sage, New Delhi.

announced the establishment of the Gujarat CSR Authority in 2014 in order to effectively drive CSR funds to the focal intervention areas of the state government, such as Water, Sanitation & Health (WASH), infant malnutrition, education, entrepreneurship, and vocational training for livelihood. Further, the government also encourages funds deriving from CSR should be utilized in human development and should be diverted to less privileged areas (40-50 Talukas or blocks) in the state. In 2018, 38 projects were implemented by the Authority covering the areas of skills development, education, health & sanitation, innovation and entrepreneurship including in rural areas, and child and infant malnutrition.

The Gujarat CSR Authority is a government agency. It provides technical services to companies in the following: 1) CSR project planning and implementation, 2) identification of the areas to invest, and 3) training program for the corporate CSR personnel. The technical services available from the Authority are given below.

- Development of CSR strategy & Annual Plan
- Development of CSR plan linked with EIA proposals
- Support for creating a dedicated CSR team
- Development of innovative project ideas
- Development of sector specific funds

Source: Gujarat CSR Authority, slides (2019)

The Authority also has a facility for small and medium scale companies whose CSR funds may not be sufficient to implement a project and also for companies who have an unspent CSR fund of the financial year. The CSR fund includes: 1) the Gujarat Education Equity Fund; 2) Malnutrition Control Fund; 3) Health & Sanitation Fund; 4) Livelihood Security Fund; 5) Vocational Training Fund; 6) Rural Entrepreneurship Promotion Fund; and 7) Special Children's Fund. These funds will be used by the projects formulated by the Gujarat CSR Authority and the corporates will receive certificates.

(2) CSR in Gujarat¹¹

The status of the CSR in Gujarat, based on the National CSR Portal established by Ministry of Corporate Affairs, is summarized below.

1) CSR Spending

The cumulative total CSR spending in the state amounted to 25.0 billion INR between FY 2014-15 and FY 2017-18. The sector wise spending report shows that health care and education have been the sectors in the state receiving the most investment. The rural development sector was ranked as the third highest CSR-invested sector. The art and culture sector superseded the rural development sector in FY 2016-17 and FY 2017-18. A summary of the sector wise CSR spending is given in the table below.

Table 3.5: Sector Wise CSR Spending in Gujarat

Particulars	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	Cumulative Total
Total Spending (in billion INR)	3.1	5.5	8.7	7.7	25.0
Spending by Sector (in million INR)					

¹¹ During the field survey, the study team approached organizations such as the Gujarat Chamber of Commerce, Gujarat CSR authority, Confederation of Commerce and Industries, and JETRO to understand the overall status of CSR in the state. However, the study team was informed that no systematic data collection on CSR had been undertaken by any one of these organizations.

Particulars	FY 2014-15	FY 2015-16	FY 2016-17	FY 2017-18	Cumulative Total
Education	1,527.2	2,064.00	2,356.90	2,488.30	8,436.40
Health Care	782.1	1,423.10	2,152.40	2,168.80	6,526.40
Rural Development Projects	237.5	475.30	-	-	712.80
Art and Culture	-	-	1,543.30	833.20	2,376.50

Source: National CSR Portal, CSR Cell, Ministry of Corporate Affairs (<https://www.csr.gov.in/index18.php>) accessed on October 12, 2019.

2) Major Contributors of CSR

The major contributing companies in CSR spending between FY 2014-15 and FY 2017-18 are given in the table below.

Table 3.6: Major Contributors in CSR in Gujarat

Year	Names of Companies	CSR Spending (in million INR)
FY 2014-15	Gujarat Mineral Development Corporation	476.1
	Kiri Industries Limited	338.9
	Torrent Pharmaceuticals Ltd.	149.7
FY 2015-16	Gujarat Mineral Development Corporation	660.3
	Adani Ports And Special Economic Zone	226.1
	Torrent Pharmaceuticals Ltd.	168.5
FY 2016-17	Oil and Natural Gas Corporation Limited	500.0
	Oil India Limited	500.0
	Adani Ports and Special Economic Zone Limited	477.9
FY 2017-18	Indian Oil Corporation Limited	713.4
	Cadila Healthcare Limited	260.4
	HDB Financial Services Limited	231.0

Source: National CSR Portal, CSR Cell, Ministry of Corporate Affairs (<https://www.csr.gov.in/index18.php>) accessed on October 12, 2019.

3) Geographical Distribution of CSR Funds

Within the state, Surat, Vadodara, and Valsad have always been the geographical areas where the highest sum of CSR funds were reported. These top ranked districts accounted for 14.7% of the total CSR spending in FY 2014-15. According to the “India CSR Report 2019”¹², tribal districts such as Dang, Chhota Udaipur, Arvalli and Mahisagar receive much less, or even nothing, in terms of resources. The data from the National CSR Portal reported quite high spending in Chhota Udaipur in FY 2017-18, in the amount of 136.4 million INR. This geographically skewed distribution of CSR funds may be due to how the statistics are generated. As it is based on the location of the companies where they are registered, the districts where the companies are located may report high figures. The district wise CSR fund availability between FY 2014-15 and FY 2017-18 as of October 2019 is given in Annexure 3.2.

¹² Srinivasan, Girija & Srinivasan, Narasimhan. (2019). India CSR Report 2019. Sage, New Delhi.

(3) Companies Implementing CSR Activities in the Project Districts

The companies located in the Project districts have been identified. The list of such companies for FY 2017-18 and the CSR activities of the main contributors are given in Annexure 3.3.

(4) CSR Activities of Companies of Japanese Firms and their Subsidiaries or Affiliates

An attempt was made to review forest- and wildlife-related CSR activities implemented by Japanese firms and their subsidiaries or affiliates in India. In shortlisting the companies for the review, “the constituents of the FTSE Blossom Japan Index Constituents list (June 2019)”, which is based on an index designed to assess Japanese firms’ performance in the area of the environment, social and corporate governance (ESG), was referred to based on the assumption that the highly rated firms may spend their CSR funds more on the conservation of forests and wildlife.

Out of the list of Japanese companies issued by the Embassy of Japan (data as of 2018), 25 FTSE Blossom Japan Index Constituent companies were identified. In addition, nine non-listed companies were also reviewed for comparison.

Each of the identified firms was checked for their CSR or sustainability reports for the nature of CSR activities undertaken. No information could be located through web-based research for seven FTSE Blossom Japan Index Constituents and two non-listed companies. Out of the companies for which CSR information was accessible, SONY India, along with WWF India, Panasonic India, Ricoh India, Tokyo Marine Holdings, and Mitsubishi Electric India Pvt. Ltd have carried out wildlife conservation and forest related CSR activities. Out of these, Tokyo Marine Holdings carries out the community based mangrove afforestation project in the Gulf of Khambhat. The review results of the CSR activities undertaken by the Japanese firms operating in India and their associates are given in Annexure 3.4.

Table 3.7: Key Points of Forest-Related CSR Activities of Two Japanese Companies

Name of Company	Key Points of Forest-Related CSR Activities
Mitsubishi Electric India Pvt. Ltd	<ul style="list-style-type: none"> • Planting trees around school yard boundary. • The company signs contract with local NGOs for implementation. The payment is linked to their performance. • Location is selected from company’s operational area and where the employees come from. • Equity and quality of outputs are given priority when company plans and implements the CSR activities.
Tokyo Marine Holdings	<ul style="list-style-type: none"> • Mangrove plantation in the Gulf of Khambhat in Gujarat. • Donation was made to the International Society for Mangrove Ecosystems. • There is no stringent monitoring was placed by the company since it is a donation to the Society. However, the Society that received the donation and execute the mangrove regeneration in the field undertakes the monitoring, which reports are shared with the company.

Source: JICA Study Team (2019) based on an interview (Mitsubishi) and e-mail communication (Tokyo Marine Holdings).

(5) Schemes/Programs of Government, NGO and International Organizations Integrating CSR

1) Schemes/Programs of Government, NGOs and International Organizations Integrating CSR

Based on a review of the CSR activities implemented by the major contributing companies indicated in Table 3.6, the government schemes/programs, NGOs and international organizations engaged in

these activities were identified. Although the list is not intended to be exhaustive, it provides some understanding of the status of convergence with government schemes/programs and partnership between the corporates, NGOs and international organizations. The findings are given in Table 3.8.

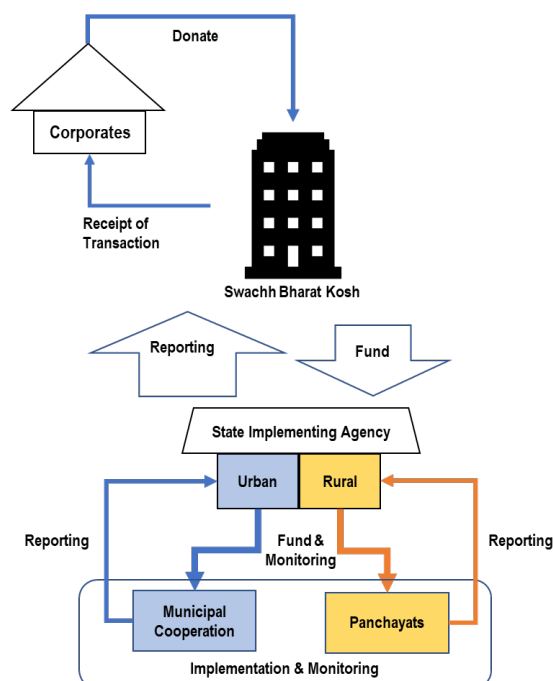
Table 3.8: Programs/Schemes Accepting CSR and Nodal Agencies

Schemes/ Programs	Sector	Nodal Agency
Swachh Bharat	Sanitation	Department of Drinking Water & Sanitation, Ministry of Jal Shakti
Swachh Vidyalaya	WASH in schools	
Poshan Abhiyaan	Program for better nutrition for children, adolescents, pregnant women and lactating mothers	Ministry of Women and Child Development
Mukhya Mantri Jal Swavlamban Abhiyan	Rural water initiative in Rajasthan	Local governments in Rajasthan
Clean Ganga Fund	Environment	National Mission for Clean Ganga
Prime Minister's National Relief Fund	Natural disaster relief/emergency response	Prime Minister's National Relief Fund
National Green Corps	Environmental education	Ministry of Environment, Forest and Climate Change
OISCA Children's Forest Program	Environmental education	OISCA
TERI Lighting a Billion Lives Campaign	Alternative energy	TERI
UNICEF Awaaz Do	Education	UNICEF
UNESCO World Heritage	Culture	UNESCO

Source: JICA Study Team (2019) based on the CSR activity reports of the selected companies.

2) Review of the Operational Framework of the Swachh Bharat and Gujarat Ecology Commission (GEC)

Based on accessible information, an attempt was made by the study team to understand the how CSR funds were utilised by a major government schemes and a registered society under the Societies Registration Act 1860.



Source: JICA Study Team (2019) based on the Stakeholder Interview and Swachh Bharat Kosh website

Figure 3.2: Simplified Operational Framework of Swachh Bharat with Private Financial Contribution

a. Swachh Bharat¹³

Corporates can donate funds to Swachh Bharat Kosh, which is placed under Ministry of Finance, Government of India, through a direct bank transaction or an on-line donation facility. Funds are released from the central mission to the state level implementing agency, which is the State Swachh Bharat Mission, under the Urban Development & Urban Housing Department or the Commissionerate of Rural Development. Thereafter, the funds are distributed to municipal corporations or to panchayats. Monitoring and reporting is undertaken by the state implementing agency, as per the modality prescribed by the Swachh Bharat Kosh. Furthermore, since these are donations, no specific reporting to each contributing party is done.

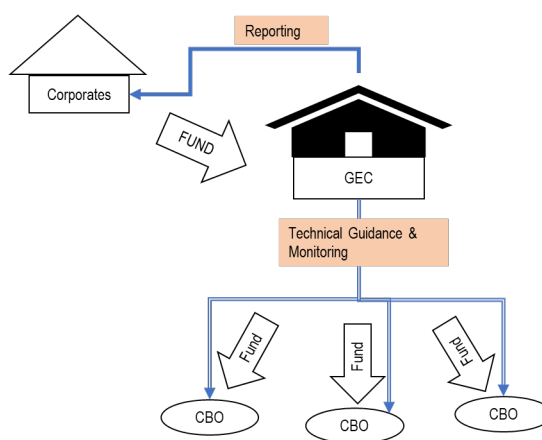
At the state level and below, no officer is appointed to manage the funds deriving from private sector as they will be taken as part of the regular activities of Swachh Bharat.

b. Gujarat Ecology Commission (GEC)

The GEC has implemented a number of mangrove afforestation projects under private financing, including CSR and compensatory afforestation in the Coastal Regulation Zone (CRZ). Between 2006-7 and 2017-18, the GEC implemented 86 projects covering 7,540 ha in total¹⁴.

Although none of the major contributors of CSR in Gujarat indicated that they have a partnership with the GEC, they implement mangrove afforestation projects through community based organizations (CBO) organized by villagers, near the plantation site, who will receive funds from the GEC to execute the work. The GEC has two technical officers who provide training, field level monitoring and prepare reports. The reports will be submitted to the financing company. A case study of the community-based mangrove afforestation works facilitated by GEC is given in Annexure 3.5.

In the case of CRZ plantation, the GEC may respond to a call for a proposal¹⁵. The roles and responsibilities of each party engaged in the private financed mangrove afforestation are summarised in the table below.



Source: JICA Study Team (2019) based on the interview with GEC

Figure 3.3: Fund Flow and Operational Framework of GEC Mangrove Afforestation with Private Funding

Table 3.9: Roles and Responsibilities of Stakeholders in GEC Mangrove Afforestation under Corporate Funding

Corporates	GEC	CBO
<ul style="list-style-type: none"> Sign agreement with GEC Provide Fund (Send to GEC) Receive report Undertake site visits for monitoring 	<ul style="list-style-type: none"> Sign agreement with Corporates and CBO Formulate mangrove afforestation project including identification of a suitable location and 	<ul style="list-style-type: none"> Consensus building in the village to engage in the project Execute the plantation Watch and ward Report any issues to GEC Mobilization of workers

¹³ This section is based on an interview with the Commissionerate of Urban Housing and Development, who is the head of the State Swachh Bharat Mission (Urban), and information available on the website of Swachh Bharat Kosh and Swachh Bharat Guidelines.

¹⁴ Information obtained from the GEC (2019).

¹⁵ For instance, GEC has responded to the call for proposal from Adani Port.

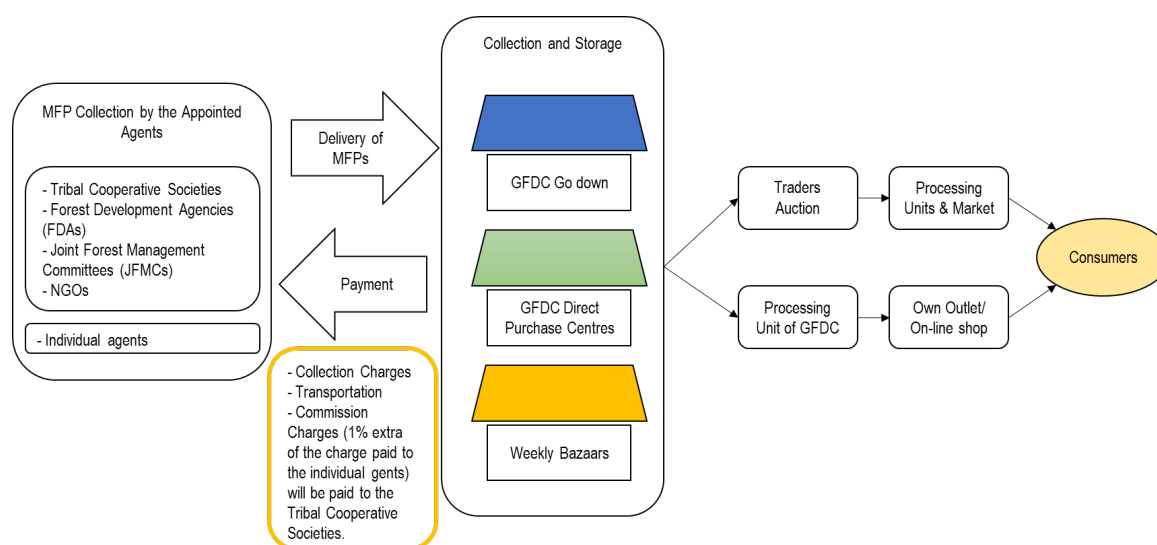
Corporates	GEC	CBO
	identification of suitable plantation models • Send funds to CBOs • Provide technical training to CBOs • Monitor the field activities undertaken by CBO • Report to Funding Company	• Distribution of wages to the workers

Source: JICA Study Team (2019) based on the interview with GEC

3.3. Minor Forest Produce (MFP) Production and Marketing

3.3.1. Gujarat State Forest Development Corporation Limited

Tendu leaves, mahwa flower and seeds, and gum were nationalized under the Gujarat Minor Forest Produce Trade Nationalization Act 1979 and the Gujarat State Forest Development Corporation Limited (GFDC) was appointed as the sole agent to handle this Minor Forest Produce (MFP). In 1996, the Provisions of the Panchayats (Extension to the Scheduled Areas) Act transferred the ownership of all MFPs to Panchayats of the respective localities where the MFPs are harvested. However, the Gujarat Panchayat Act 1998 subsequently enabled the GFDC to trade MFPs derived from the scheduled areas in the place of Gram Panchayats on a “no-profit-no-loss basis” as a marketing facilitating agency. The GFDC is reported to handle 96 MFPs, including nationalized MFPs. The figure below captures the GFDC and weekly local market based supply chain.



Source: JICA Study Team (2019) compiled based on the website of GFDC¹⁶

Figure 3.4: Overview of MFP Supply Chain through GFDC

Other than the marketing channels shown above, MFPs can also be directly sold by the primary collectors to the traders. However, no record of such transactions is available. Medicinal Plants can be traded on-line through e-Charak, which was established by the National Medicinal Plants Board, which also launched a voluntary certification scheme for medicinal plants.

It should also be noted that under the National Biodiversity Act (2002), a Biodiversity Management Committee (BMC) was formed at each local body and is responsible for keeping track of access to biological resources and the benefits deriving from them, and for ensuring the sustainable use of

¹⁶ <https://gsfdcltd.co.in/pages?page=collection,%20processing%20and%20marketing%20of%20minor%20forest%20produce>

biological resources, of which MFPs are a part. However, currently, the capacity of the BMC is yet to be fully developed and thus record keeping has not become a regular practice of the BMC.

(1) MFP Collection¹⁷

Since MFPs in Gujarat are traded through various channels and no systematic record keeping is done, a record of volume traded and the sales value of MFPs traded outside of the GFDC is not readily available. The only accessible data was from the GFDC/GFD. However, it should be noted that the GFDC's data is based on the volume procured by the GFDC, and thus the data does not include the volume sold directly to the traders by the collectors¹⁸. According to the state level MFP data, honey, mahua flowers, and gum recorded high sales values in FY 2017-18. In FY 2018-19, honey fetched as high as 9.1 million INR with 27.8 metric tons of collection. The state level MFP data is given in Annexure 3.6.

To understand the district wise availability of MFPs in the state, the study team has collected information on the MFP collection targets allotted by the GFDC. This data will help us identify the MFP availability in the Project area. The highest number of MFPs is available in Chhota Udaipur and Narmada districts, followed by Panchmahal, Sabarkantha, Banaskantha, and Mahisagar districts. The table below summarizes the district wise MFP availability information and Annexure 3.7 provides the division wise availability.

Table 3.10: MFP Seasons, Availability in Districts and Collection Target Allotted by GFDC (FY2018-19)

Sl. No	Name of MFP	Available Districts																	Target Allotted in Kg				
		Sabarkantha	Banaskantha	Panchmahal	Mahisagar	Dahod	Chhota Udaipur	Narmada	Navsari	Katchh	Dang	Devbhumi	Dwarka	Junagad	Rajpipla	Himmatnagar	Godhra	Vansda		Santrampur	Baria	Bhuj	
1	Mahua Flowers (dried)	x	x	x	x	x	x	x	x						x	x	x	x	x	x			4,350
2	Mahua Dodi	x	x	x	x	x	x	x	x						x	x	x	x	x	x			4,450
3	Wild Honey									x												x	1,000
4	Harde							x			x							x					500
5	Baheda	x	x	x		x	x	x	x						x	x	x	x		x			750
6	Tamarind (with seeds)			x		x	x	x							x		x						600
7	Salai Gum	x						x								x							200
8	Guggul									x		x	x	x								x	200
9	Bael pulp	x	x	x		x	x	x							x	x	x						150
10	Kusumi Lac						x	x							x								50
11	Giloe						x	x							x								110
12	Jamun dried seeds						x																50
13	Puwad Seeds	x	x	x			x	x			x					x	x	x					200
14	Dried Amla Pulp (deseeded)	x	x	x	x	x	x	x	x						x	x	x	x	x	x	x		400
15	Chironji pods with seeds						x																50

Source: GFDC (2019)

¹⁷ District wise NTFP production data was requested from the Gujarat Forest Department and Gujarat Forest Development Cooperation. However, during the 1st field survey, only state level data was made available to the study team. Follow up has been attempted, but the data has yet to be located at the time of the compilation of the report.

¹⁸ The Biodiversity Management Committee under the Biodiversity Act 2002 is expected to play a key role in keeping track of the collection and transits of natural resources, including NTFPs. However, the institution has yet to function.

(2) Minimum Support Price (MSP)

Minimum Support Price (MSP) is a scheme under the Ministry of Tribal Affairs in support of MFP collectors, through which a fair price is ensured for MFPs collected by the tribal communities. The scheme aims at promoting the sustainable harvesting of MFPs and enhancing the livelihood of the primary collectors. The MSP is set by the recommendation of TRIFED and is officially published by the Ministry of Tribal Affairs. In the case of Gujarat, the GFDC is the agency that operates the scheme.

For 2018, 29 MFPs were procured under MSP scheme. Wild honey (195 INR/kg), charoli pods with seeds (*buchanania lanzan*) (109 INR/kg), guggul (*commiphora wightii*) (700 INR/kg) are under MSP. The list of MFPs supported by the MSP scheme is attached in Annexure 3.8.

(3) Processing and Marketing of MFP

Some of the MFPs aggregated by the GFDC are sold through auction. Other MFPs like honey and ayurvedic products are processed by the GFDC and sold at its own outlets, which are at eight locations in the state. None of the MFP products have been exported so far and the GFDC does not have a plan to do so in the near future. At smaller production units like cluster organizations, only basic or no processing is done. Such produce is traded locally. (See Section 3.3.2 for the case of Visdalia Cluster).

(4) Capacity Building

The primary collectors are trained by the GFDC, as the need arises, on sustainable harvesting and primary processing skills. MFP collection being the traditional practice of the tribal communities, their traditional knowledge is applied in collection and thus the requirement for skills training is not high.

The Van Dhan Scheme was initiated in 2018 by the Ministry of Tribal Affairs and TRIFED to enhance the skills of primary processing and value addition. These are SHG-based interventions and 10 SHGs will constitute one Van Dhan Vikas (a kind of a common facility center) and will be provided with the equipment and facilities required to undertake primary processing and value addition. Skills training will also be given by the scheme. In Gujarat, the GFDC is the nodal agency for carrying out the scheme and Chhota Udaipur and Himmatnagar have been identified as the first two intervention areas. The GFDC is in the process of preparing the work plans for these two locations based on a situational analysis.

3.3.2. Supply Chain of Products of Cluster Organizations: Case Studies

In this section, case studies on bamboo, wild honey, spices, vegetables, and charoli seeds were implemented based on findings derived from site visits conducted during the first field survey.

(1) Visdalia Cluster Cooperative Society

The cluster was formed during GFDP II and, in 2018, the cluster organization was registered under the Cooperative Society Act 1950. The Visdalia Cluster Cooperative Society (VCC) was formed in the Kotwaliya¹⁹ tribal area and is comprised of 18 JFMCs, which also include SHGs formed within the overlapping locality. As per the 1950 Act, VCC has a managing committee comprised of three persons, including two female committee members. Three full time staff members — a cluster manager, an accountant and a livelihood resource person — have been engaged by VCC. Currently, 34 male staff members and 47 female staff members are engaged from the local tribal community. The cost of engaging these staff members is met by the earnings of VCC. All staff members are from the tribal community in the locality. The society takes 15% of the profit to meet organizational expenses and the rest is for the staff members. VCC deals with several activities, like bamboo furniture and structure making, spices, wild honey, paper crafts, and vegetables, and runs SHG canteens and a farm produce aggregation center. The net profits deriving from these activities for FY

¹⁹ The Kotwalia is a tribal group.

2018-19 are given in Table 3.11. Within the vicinity of the cluster center, a multiple number of activities take place, which helps in quality control. Further, some of the activities are seasonal, but other activities can be undertaken at the cluster center, which also helps balance the revenue that goes to VCC. Now VCC has a welfare/insurance scheme for its workers. In this section, the supply chain of the selected products dealt by VCC is reviewed.

Table 3.11: Activity Overview of VCC and Net Profit for FY 2018-19

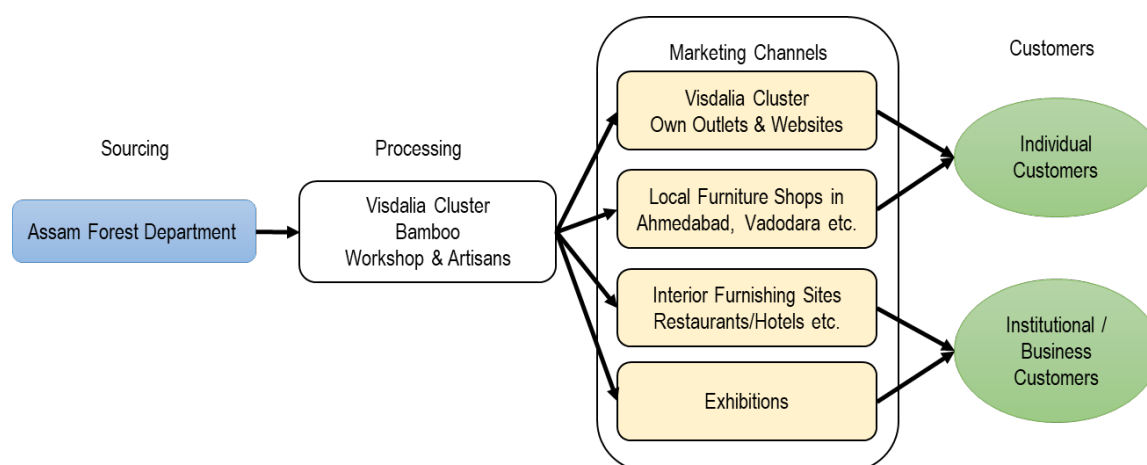
Activities	No of Persons Engaged		Net profit FY 2018-19 in INR
	Men	Women	
Bamboo	30	15	1,200,000
Spices		5	150,000
Pulses	2		120,000
Mushroom	2	10	45,000
Paper Bag		5	85,000
Restaurant		12	35,000
Total	34	47	1,635,000

Source: Visdalia Cluster Cooperative Society (2019)

1) Bamboo Furniture

Bamboo furniture, interior furnishings and structures provide major income to VCC. The raw materials are sourced from Assam, with the help of the Forest Department, since the locally sourced bamboo is not suitable for furniture and structures. The processing work is done at the workshop in the VCC cluster common utility centre, where they have equipment, work space, storage and a showroom. For the instalment of bamboo structures, VSS workers are dispatched and work on site.

The Kotwaliya community has a tradition of making bamboo handicrafts. Thus, they were familiar with the material and had the necessary skills. The initial training was given by the Aga Khan Rural Support Programme. VCC also collaborates with the National Design Institute (NDI) and receives students for practicums, through which product development/innovation can happen. Further collaboration is in production development and is under discussion with NDI. VCC engaged a bamboo product development specialist from Chhattisgarh to train the artisans and to control the quality of the finished products.



Source: JICA Study Team (2019) based on the field findings

Figure 3.5: Supply Chain of Bamboo Furniture (Case of Visdalia Cluster)

As shown in Figure 3.5, there are four main marketing channels for the bamboo furniture: 1) their own outlets and websites; 2) local furniture shops where individual customers are dominant; 3) restaurants and hotels; and 4) exhibitions. Approximately 25% of the profit derives from furniture and interior furnishings, and 45% from the bamboo structure/construction where VCC sends artisans

for on-site installation. VCC also sends out catalogues on WhatsApp²⁰ and advertise through social media. No certification has been obtained for the bamboo and bamboo products.

Table 3.12: Cost and Profit of Bamboo Products (FY 2018-2019)

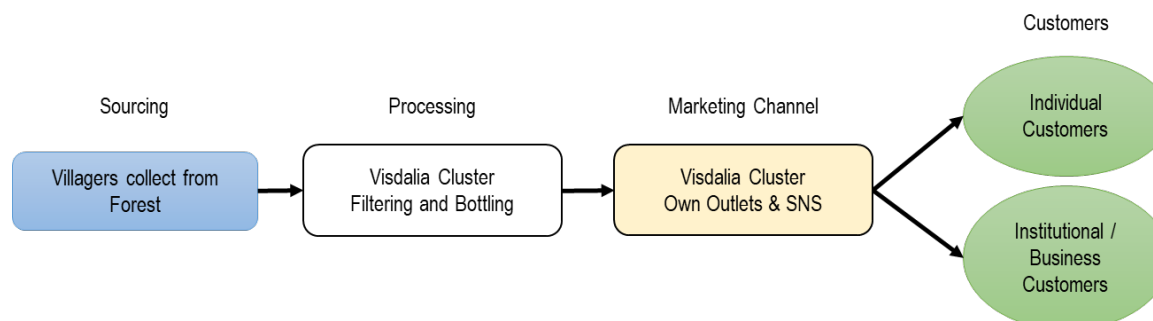
Particulars	Amount (in INR)
Raw Material	1,200,000
Cost of Labor	1,800,000
Man days generated	4,220
Cost of Transportation	126,000
Net Profit	750,000

Source: VCC (2019)

2) Wild Honey

Wild honey is collected by the village youth in the surrounding villages. There are 8-9 villages within 10-15 km of the cluster center collect and these supply honey to VCC. The villagers go to forest in a group for collection. The collection technique is traditional, using smoke. The volume of supplies to VCC is increasing. In FY 2017-18, 250 kg were supplied; this increased to 800-900 kg in FY 2018-19. Honey collection is mainly done by male members of the community. In FY 2018-19, the number of collectors was recorded to be 30 persons, which is almost tripled from that of FY 2017-18.

The processing of honey at VCC is very simple. Once the honey is brought in plastic containers, it is filtered using cloth and then bottled. VCC bottles it in a beautiful glass bottle and advertises the result on Instagram. The bottle attracts customers who buy it as a gift. As of now, the marketing channel is limited only to its own means of distribution. However, VCC is exploring opportunities in the larger market. The wild honey was checked and certified for genuine quality by the GFDC. However, this has been done only once. There is still room for improvement in quality checking and storage.



Source: JICA Study Team (2019) based on the field findings

Figure 3.6: Supply Chain of Wild Honey (Visdalia Cluster)

When the villagers bring honey to VCC, they receive payment on the spot for the honey depending on the volume supplied. VCC currently pays 350 INR per liter, which is much higher than MSP (195 INR per kg, MSP in 2008). As they used to be paid 100 INR – 150 INR per liter by traders, this is a substantial enhancement to villagers' income. The volume supplied to the cluster each time is small and thus they do not require any transportation cost.

3) Turmeric and Chilies

VCC offers a range of powdered spices through their brand, Mother Spice. However, not all the raw materials are sourced locally. When preparing a spice mixture like tea masala, some ingredients are sourced from outside of the state and are expensive. Thus, they find spice mixtures less profitable.

²⁰ WhatsApp is a mobile application widely used in India.

Recently VCC distributed organic turmeric seeds and planting started. VCC also plans to introduce organic chilies from next year. Current production is shown in the table below.

Table 3.13: Production of Turmeric and Chilies

	FY 2016-17	FY 2017-18	FY 2018-19
Turmeric			
Area Under Cultivation	-	N/A	N/A
No of Families engaged	-	20	35
Production Volume	-	700 kg	1200 kg
Chilies			
Area Under Cultivation	-	N/A	N/A
No of Families engaged	-	12	20
Production Volume	-	400 kg	600 kg

Source: VCC (2019)

The produce is powdered at VCC and sold directly at the market. The sales prices are enhanced by 30-40% if sold directly at the market, instead of selling it to traders. As seen in the table below, it makes a significant difference for the producers to have direct access to the market. This provides a good basis for further strengthening market linkages of these produce items in the coming phase.

Table 3.14: Comparison of Selling Prices of Turmeric and Chilies

Sell to:	Turmeric	Chilies
Selling Price to the Traders in INR per kg	145	125-140
Direct Selling Price at the Market in INR per kg	200-225	190-200
Price Enhancement by Direct Selling at the Market	38% - 55%	36% - 60%
Form of Product	Powder	Powder

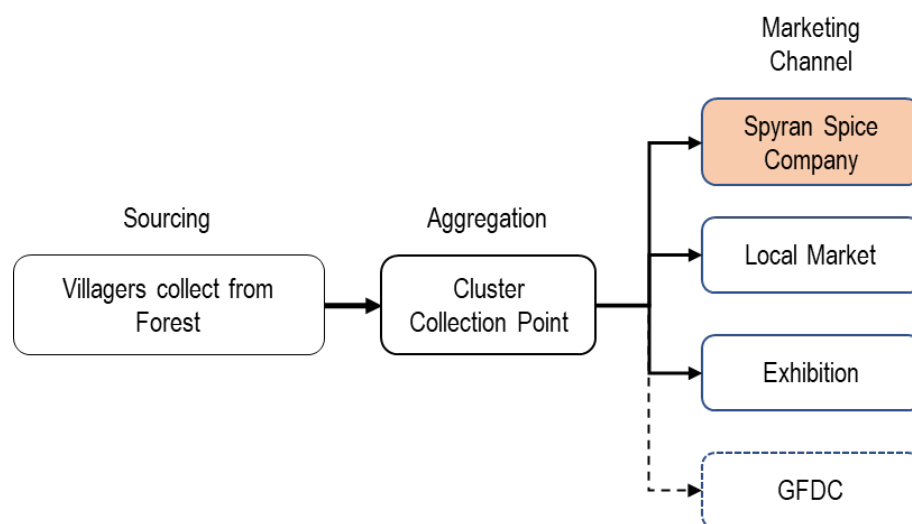
Source: VCC (2019)

VCC receives many tourists from outside of the locality who are conscious of the quality of ingredients used in the spices. Since they are the main clientele of Mother Spice so far, VCC felt the need to start organic spice cultivation. On the other hand, VCC also supplies its spices for the Mid-Day Meal Scheme (a government scheme providing mid-day meals at 70 locations of Anganwadi, rural child care centres, and schools). For this, the mixture is prepared as per the requirement of the government.

VCC is keen to obtain organic certification for turmeric and chilies. They recently acquired certification from the Food Safety and Standards Authority of India (FSSAI), which is a basic requirement of food products to be sold in the market. This means that their spice powders can be sold in the market beyond existing outreach.

(2) Charoli (*Chironji/buchnanial anzan*)

Charoli are seeds from the *Buchanania lanzan* tree; they are used as dry fruit. They are valued in the local economy and still exchanged with other household items at the local market. In Bordha Village in Chhota Udaipur, a charoli cluster was formed. Each village collects charoli seeds and bring them to Bordha by the vehicles of GFD when they come back from the villages after delivering saplings to the designated sites. No processing is done with Charoli, and harvesting is done as per their traditional practice.



Source: JICA Study Team (2019) based on the field findings

Figure 3.7: Charoli Supply Chain (Bordha Village, Chhota Udaipur)

Production related information between FY 2016-17 and FY 2018-19 is given in the table below.

Table 3.15: Production of Charoli

Particulars	FY 2016-17	FY 2017-18	FY 2018-19
Volume Harvested in kgs	1,797	1,886	1,745
No of Persons Engaged for Collection	83	98	94
Net Profit in INR	72,500	70,000	N/A

Source: Livelihood Coordinator, GFD (2019)

The cluster has had an arrangement with Spyran spice company since 2014-15. Once the produce is brought to the company, payment is made by the company within 15 days. The company does not have any quality standard for its suppliers. The produce sourced from various locations is mixed all together irrespective of quality. Currently, the market price for charoli is 700 INR/kg, which is nearly 6.5 times higher than MSP (109 INR per kg for FY 2018-19). The distribution of profit is done according to the volume collected by the villagers and the amount will be discussed among the JFMC committee members and GFD personnel.

Other companies, like the DMart supermarket chain, and hypermarkets are willing to pay a very high price for charoli, but do not wish to receive it in bulk. The cluster is also in discussion with the GFDC on MSP and benefit sharing with JFMC, but this has yet to start.

Charoli from this area is also certified by CGCERT. The holder of the certification is Vanvasi Mahil Swa Sahai Juth, Bordha, a women's organization in the locality. According to the certificate, 315 metric tons of charoli is available in the certified area. The certificate will be renewed in March-April 2020. The cost of certification is between 16,000 – 18,000 INR. In addition, expenses for inspection will also be met by the applicant, at a cost of between 3,000 – 4,000 INR. So far funding for certification has been met by the GFD. The documents are to be produced in Hindi or in English and thus it is a challenge for the villagers to prepare the documents required for certification.

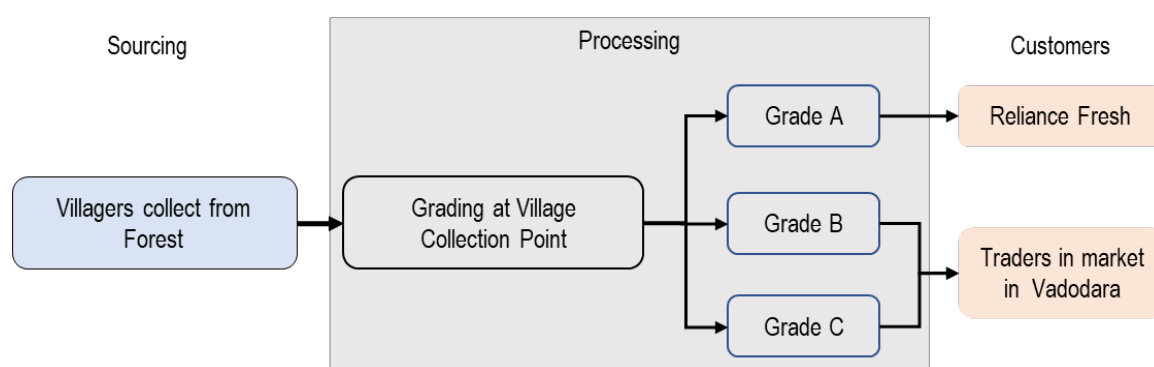
(3) Rajawat Village, Chhota Udaipur

In Chhota Udaipur, 46 JFMCs in six forest ranges collect wild custard apples. Most of the villages do not grade the produce and sell it to the traders all at once. In Rajawat Village, JFMC grades the custard apples. Their custard apples are certified by CGCERT. The sales amount in 2018 was seven million INR. The case of Rajawat Village in Chhota Udaipur is reviewed below.

1) Organic Custard Apple

Rajawat JFMC collects wild custard apples from the JFM area of 114.51 ha. Their custard apples have been certified by CGCERT, with a potential harvest volume of 29.5 metric tons. The certification has to be renewed every year. With the help of the livelihood coordinator, whose engagement was extended by GFDP II and by the GFD after the project completion, the cluster could renew the certification. The cost for renewing the certification was 25,000 INR, which was supported by the GFD.

Villagers were trained in grading custard apples during GFDP II. The best quality custard apples will be sold to Reliance Fresh and the rest to the regular traders. For the lowest quality custard apples, extraction of pulp was once attempted but it could not be sustained as there was a lack of manpower, since the season for custard apple collection and farming coincided. The custard apple season is about 15-30 days a year.



Source: JICA Study Team (2019) based on the field findings

Figure 3.8: Supply Chain of Organic/Wild Custard Apples (Rajawat Village, Chhota Udaipur)

Custard apples now sold by Rajawat JFMC get a premium of 50 INR per 20 kg for all the grades, while prior to the Project intervention the traders only paid 100 INR per 20 kg irrespective of quality. Last season's harvest (2017-18) was 7,000 kg and earned 125,000 INR. Out of total earnings, 40,000 INR were derived from sales to Reliance Fresh. The rest was sold at the market in Vadodara. The profits are shared among the villagers who participated in the collection of the custard apples in accordance with the volume collected.

Table 3.16: Custard Apple Harvesting and Profits

Particulars	FY 2016-17	FY 2017-18	FY 2018-19
Volume Harvested in Kgs	345,620	494,740	532,845
No of Families Engaged in Collection	1,672	2,071	2,156
Net Profit in INR	4,642,554	6,838,245	7,045,487

Source: Livelihood Coordinator, GFD (2019)

In the table below, a price comparison between certified and non-certified custard apple is given. Although the table shows the difference in prices, the results of an interview with the person in charge of Reliance Fresh indicated that quality matters, but not certification or being organic. Thus, the custard apples procured from Rajawat Village are sold in the supermarket like any other, without being labelled organic or wild. Reliance Fresh does not provide any training to the primary collectors but informs them about what level of quality is required.

Table 3.17: Price Comparison (Certified and Non-Certified Custard Apples)

Unit: INR per 20 kg

Grade	Organic/Wild Certified	Not Certified
A	450	400
B	300-350	200-300
C	150	100

Source: JICA Study Team (2019) based on field findings

3.3.3. Supply Chain of Spices: A Case of a Japanese Spice Company²¹

An interview was conducted with the House Food Group Inc., a manufacturer of spices and spice-based food and health products in Japan, to understand how the Japanese firm is developing the spice value chain. Between April 2018 and March 2019, its market share for the curry roux product in Japanese market was recorded at 62.2% and 22.6% for the spices²². The company is also known for a turmeric-based health support drink, called Ukon-no-Chikara. The company places value in sustainability and attempts to improve its market competitiveness by strengthening its value chain from producers of the raw materials to consumers.

In the case of turmeric, the company procures raw materials from India, Viet Nam and China through a multiple tier of traders. Technical guidance on production and processing is also provided to the producers by the company through local partners. In the value chain, several issues were experienced by the company: 1) producers do not follow or adjust according to the technical specifications given by the company; 2) transportation of the products; and 3) transaction costs induced by engaging multiple tiers of traders/suppliers for the aggregation of products with good quality.

The company indicated that ensuring that production and processing be carried out as per their technical specifications would reduce the involvement of the multiple traders/suppliers and minimize transaction costs, which would ultimately enhance the market competitiveness of the products. For this, the company thinks that working closely with the primary producers could provide a solution to overcome the challenges. They are willing to invest in building the processing infrastructure if the following conditions are met.

- Inventory of products and producers, production volume and quality are prepared.
- Farmers are organized into groups (e.g. a Farmer Producer Organization or cooperative)

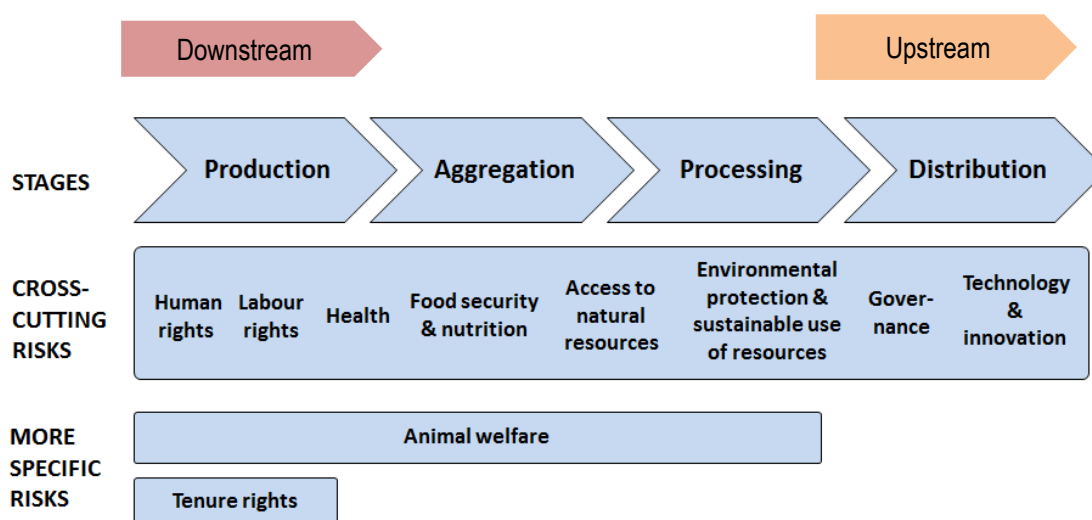
3.4. Firms/Organizations Practicing Responsible Supply Chain Management on Forestry and Agriculture Produce

3.4.1. Defining a Responsible Supply Chain

The supply chain for the produce as discussed above is comprised of multiple stakeholders, such as collectors/producers, traders, transporters, processing companies, and customers. A process of production, aggregation of produce, and processing and distribution is managed by these participants. In the supply chain, various risks related to such things as human rights, labor rights, sustainable natural resource use and access, the environment, the health and safety of the workers, food security and nutrition, animal welfare, governance, and technology and innovation can occur as illustrated in Figure 3.9. A responsible supply chain addresses such multi-faceted issues that can occur at various stages of the supply chain.

²¹ This section is based on the interview with House Food Group Inc. conducted in August 2019.

²² Integrated Report 2019, House Foods Group (p. 7).



Source: OECD-FAO Guidance for Responsible Agricultural Supply Chains (2016). OECD/ FAO. OECD Publishing, Paris. (p.20)

Figure 3.9: Risks at Various Stages of Agriculture Supply Chains

A responsible supply chain can also be understood differently, depending on the stage at which the supply chain stakeholder is engaged. For instance, if the stakeholder stands at the upstream of the supply chain, for example a manufacturer procuring the raw materials from farmers, then the stakeholder may be concerned about issues like production, transportation, storage, and primary processing. If the stakeholder is at the downstream, the risks can be identified around the farm and farming activities.

In building a responsible supply chain, obtaining certification helps address various issues that occur in the supply chain. Certification like Forest Stewardship Council (FSC) may help to address social aspects of the supply chain such as labor rights and health and safety, whereas organic and wild certification focuses on preventing negative environmental impact by farming and the collection of produce. In the subsequent sections, some cases of some downstream stakeholders are reviewed.

3.4.2. Firms Devising Certification System for Responsible Supply Chain Management

(1) Uttar Pradesh Forest Corporation (UPFC)

The Uttar Pradesh Forest Corporation (UPFC) obtained FSC certification for Forest Management in February 2015 after several years of research and an application process. Certification has been given to 418,602 ha and 66 species of the Terai Belt, which spreads across northern states bordering Nepal. This is the largest certified forest area for commercial purposes in India. The certified timber is exported mostly to Europe. The cost of obtaining certification was 4-5 million INR, which was borne by the UPFC. Maintaining the certificate requires dedicated staff for documentation and monitoring. Annual surveillance also incurs 2.5 million INR, which is mandatory for maintaining the status of certification. The certified timber is sold to export traders. By obtaining the certification, timber sales revenue was enhanced by 3%. Revenue recorded in 2018-19 was sufficient to meet the annual surveillance cost.

Although the regular practices of the Forest Department (FD) have always met FSC requirements, their forest management practices have been further strengthened by getting certified. The advantages of obtaining certification included 1) the regularisation of worker's wage payments; 2) improvement of worker safety; 3) discontinuation of the usage of environmentally harmful pesticides in the nursery; 4) introduction of welfare schemes for workers; and 5) knowledge opportunities for FD staff members, who are keen to learn technical knowledge so that they can give full explanations during the audit

and more consciously put their knowledge into practice.

(2) Organic India²³

Organic India is a manufacturer and exporter of organic food, tea and herbal products. It supports sustainable and organic practices, rural farmers and tribal communities in India. The company works very closely with rural farmers and tribal communities and invests in developing their capacity in organic and sustainable agriculture. The company also meets the cost of organic certification for them. The partnering farmers are from the tribal communities in Uttar Pradesh, Rajasthan and Gujarat. Premium prices will be paid for produce from such producers. The company obtained various certifications as required in the target market. Those certifications include: Good Manufacturing Practices (GMP), Hazard Analysis & Critical Control Points (HACCP), ISO 9001:2008, NPOP India Organic, Non-GMO Project verification, and ECOCERT, the outlines of which are given in Section 3.5.

In India, Organic India products are found at Fabindia, supermarkets in major cities, and organic shops. Outside of India, their products are sold in the US, Canada and the UK.

(3) Himalaya²⁴

Himalaya is a manufacturer and exporter of herbal and ayurvedic health care products and cosmetics. The company has the GMP certificate from the Directorate of Indian Systems of Medicine, Bengaluru. To maintain its quality, several standards are adopted by the company, among which are Good Agricultural Practices (GAP) and sustainable harvesting practices, GAP guides its suppliers in production and harvesting of raw materials. The outlines of GMP and GAP are given in Section 3.5. The company sells its products in India and exports to 92 countries in the North America, the Middle East, Asia and Europe.

(4) Sustainable Spices Initiative India²⁵

The Sustainable Spices Initiative India (SSI-I) promotes Indian spice companies to sustainably source raw materials, through which it intends to provide safe and sustainable spices to consumers. By 2025, it will have attempted to enhance the production of sustainable spices up to 25% in India. SSI-I partners with NGOs and corporates. It also conducts training for farmers in sustainable spice production. Validation by the implementing partners (i.e. NGOs) of the farmers will also be undertaken. SSI-I also facilitates third-party verification of the final products sold in the market, to see whether they comply with sustainability standards. Its partners include: Nestle, ITC, and Jayanti. Some of the activities seen in their organizational profile includes: organizing buyer-seller meets for the Meghalaya Basin Development Authority (April 2019); participating in buyer-seller meets in Andhra Pradesh (2019); a field audit for a chili project in Telangana (2018); and the commencement of coriander project in Rajasthan (2018).

(5) Various Responsible Shopping Websites

There are on-line shopping sites selling products that comply with responsible supply chain principles. A few of the companies are given in the table below. The broad description of the certification obtained by each of the sites is given in Section 3.5.

²³ This section is based on <https://www.organicindia.com/about-the-company>.

²⁴ This section is based on <http://www.himalayaherbals.com/index.htm>.

²⁵ This section is based on https://ssi-india.org/who_we_are.html.

Table 3.18: Online Shops Ethical Produces

Name of the Company/ Organization	Description	Certification obtained by the Company	Website
Better India	Shopping gateway: water saving devices, organic foods, biodegradable/eco-friendly items, traditional handicrafts, etc.	Product wise/supplier wise	https://shop.thebetterindia.com/?ref=tbimenu
Two Brothers India (Amorearth)	Production/processing/retail: dairy based products, spices, pickles, etc.	ECOCERT	https://twobrothersindia.com/
Conscious Food	Processing/retail: food items including spices	APEDA NPOP PGS/Decentralized Organic Farming Certification System certified farmers supported by the National Centre for Organic Farming (NCOF), Government of India. In the case of tribal farmers, it can accept items as organic without certification. Conscious Food itself is certified ECOCERT, HAACP	https://consciousfood.com/

Source: JICA Study Team (2019) compiled from the websites of each company

3.5. Certifications/Systems that Support Responsible Supply Chain

Certificates are obtained by various companies/producers in response to market requirements. In particular, the companies exporting produce or targeting conscious markets which are emerging Mumbai, Delhi, and Bengaluru, use different types of standards for sustainable supply chain management. In this section, a review of the certification system adopted by the manufacturers and JFMCs reviewed in Sections 3.3 and 3.4 are reviewed. Options for small scale farmers/farmers' groups such as JFMCs/EDCs/SHGs are also given in the last half of the section.

(1) Certifying Agencies and Certification System/Program Identified in Sections 3.3 and 3.4

Certifying agencies and key certification system/programs identified from the review of company policies on sustainable supply chain management are given in the table below.

Table 3.19: Certifying Agencies Identified in Sections 3.3 and 3.4

Certifying Agency	Description
Chhattisgarh Organic Certification Society for Forestry & Agriculture (CGCERT)	Provides certification as per National Standards of Organic Production (NSOP) of India and complies with National Program for Organic Production (NPOP). Certification is offered for organic agriculture, horticulture production, wild collection, processing, trading and input approval.
Gujarat Organic Producers Certification Agency (GOPCA)	Gujarat State Government agency for organic certification for crops including medicinal plants in accordance with NPOP.
Control Union Certifications	Accredited agency for certifying in accordance with NPOP; its certification complies with the United States Department of Agriculture's National Organic Program and the Japanese Agriculture Standard (JAS). The certification applies to sustainable agriculture, processing, production methods and raw materials.

Source: JICA Study Team (2019) compiled from various sources.

Table 3.20: Key Certification System/Program Identified in the Section 3.4

Certification	Description
National Programme for Organic Production (NPOP)	Production and accreditation system recognized in European Commission, Switzerland and the US. Certification
EU Organic Certification	Organic food standards in Europe. The ingredients of a product must contain more than 95% organic materials if it is to be called organic.
ECOCERT	Accreditation agency having 80 branch offices around the world with its headquarters in France. Certifies agricultural produce, processed food, livestock producers, cosmetics, cotton, etc. ECOCERT also provides fair trade recognition.
Participatory Guarantee System for India (PGS)	Decentralized organic farming certification system under the Department of Agriculture & Cooperation, Ministry of Agriculture and Farmers Welfare. It is a peer certification system for the small holder producers. The participating farmers certify each other for organic farming. Two types are available: PGS Green and PGS Organic.
Good Agriculture Practices (GAP)	Certification for hygiene and food safety in production and post-production process in agriculture.
Good Management Practices (GMP)	A comprehensive food safety standard applied to the manufacturing process, waste management, and employees' personal hygiene.
Hazard Analysis & Critical Control Points (HAACP)	Food Safety Management System in compliance with World Health Organization Standards.
Forest Stewardship Council (FSC)	FSC can be applied to forest management, consumers, forest produce and produce that includes forest produce. Three types of certifications are available: Forest Management (FM) and Chain of Custody (CoC) for processing and distribution process; and certification granted to a project which is valid for the project duration. In the supply chain of forest produce and forest resource based products, all partners except retailers need to be certified in order to sell the end products as FSC products.
Voluntary Certification Scheme for Medicinal Plant Produce (VCSMPP)	A certification scheme launched by National Medicinal Plants Board, Ministry of Ayush, India jointly with the Quality Council of India. Both the production and collection process, as well as quality will be subject to review. Standard for good field collection practices requires compliance with sustainable harvesting practices.
Food Safety and Standards Authority of India (FSSAI)	Food Safety and Standards Authority of India (FSSAI) provides certification in compliance with the Food Safety and Standards (Food Product Standards and Food Additives Regulation, 2011), Food Safety and Standards (Packaging and Labelling) Regulation, 2011 and Food Safety and Standards (contaminants, toxins, and residues) Regulations, 2011. The standards cover manufacturing, storage, distribution, import and sales concerning food. For a food product to be marketed widely in India, this standard is a basic minimum requirement. Dairy products, oil, fruits, cereal, spices are among the products to which the standards are applied.

Source: JICA Study Team (2019) compiled from various sources.

(2) Options for JFMCs/EDCs/SHGs

In Rajawat Village in Chhota Udaipur, custard apples were certified by CGCERT as a wild produce. In the Project area, several other JFMCs obtained certification for the same. However, the field interaction indicated that JFMCs face challenges when it comes to maintaining the certificate²⁶ and using it to enhance the value of their produce.

²⁶ The documents to be filled are English and Hindi. Thus, the villagers who are not so conversant with these two languages find it difficult to renew the registration without facilitation.

1) Selection of the Produce to be Certified

Fruits have short shelf life. Thus, without having identified buyers that value certified products, it would be difficult to market them in time and to fetch the right price. Considering the inadequate storage facilities and transportation system suitable for fruits, quality is likely to deteriorate before it reaches the right markets, which are located in distant locations. Thus, irrespective of the value of the produce, the fruits are most likely consumed within the locality. Other NTFPs or medicinal herbs which are having longer shelf life may provide better options for certification.

In particular, wild produce is said to be appreciated in the European market and wild certification is valid as soon as the products are certified, unlike organic produce, which requires a conversion period of three years before it becomes fully certified as organic. Once the certificate is obtained, marketing efforts should be made by attending exhibitions like BIOFACH India²⁷ and participating in farmers markets organized by the organic producers themselves in Mumbai, Delhi, Bengaluru, and other places. A list of merchants dealing with organic produce in Gujarat is given in Annexure 6.12.

2) Options for Certification

Provided that effective marketing efforts are made, the following certifications may be considered as options for the JFMCs/EDCs/SHGs. As reviewed below, to become a producer in responsible supply chain management, Fairtrade Certification could be more relevant as it looks at not only the process of production and quality but also human rights and the environmental impact of production. Depending on the market requirements, organic and wild certification may also be obtained along with Fairtrade Certification.

a. CGCERT

CGCERT is an agency in Chhattisgarh that provides certification for agricultural and forest produce and for both organic and wild. As done in GFDP II, in the project areas, charoli, wild honey and medicinal plants can be considered for wild certification. As wild certification will be effective from the day of certification as being equivalent to organic, certified produce can be delivered quickly to the market and the potential may be high for export to Europe. The application process and cost of certification can be found on the web-site (<http://cgcert.com/wp/>).

b. Participatory Guarantee System (PGS) India by PGS Organic India Council

PGS was launched by the National Centre of Organic Farming, the Government of India, as an alternative and inexpensive option for organic certification. This system suits small groups of farmers such as village- or taluka-based groups, SHGs, and community-based groups assisted by NGOs. This system complies with the International Federation of Organic Agriculture Movements 2005 Organic Standards and the National Standards of Organic Production/NSOP (Government of India). This keeps the production process and quality in check. However, before applying for PGS, its validity in the market should be carefully assessed.

c. Fairtrade Certification by Fairtrade International

This certification system provides a comprehensive framework for sustainable farming and development of producers' organizations in developing parts of the world. Thus, compliance with these standards could be seen as an indication of supply chain constituents. The certification system is comprised of social, environmental and economic spheres of productive activities. Currently 25 companies and organizations are found among the network of certified producers. Under the Fairtrade Certification system, standards are available for small scale producers, hired labour organizations, contract production, gold mines, traders, carbon trading, and textile supply chains. Products covered include vegetables, fruits, tea, textiles, and gold. A synopsis of the standards for small scale producers are provided below. In addition to this, product specific standards are also to be complied with.

²⁷ <http://biofach-india.com/visitors>

Table 3.21: Synopsis of Fairtrade Standard for Small-Scale Producer's Organization

Particulars	Key description
General	Pre-condition for application: collective and democratic decisions taken to obtain the certification; legal entitlement to access to land, water use and land tenure Small-scale producer organization: 2/3 of the members are small-scale producers; each of them cultivate land less than 30 ha; 2/3 of production volume deriving from small scale producers.
Trade	Requirement of traceability, sourcing, contracts, use of Fairtrade trademarks.
Production	Production practices Environment: environmental management, pest management and hazardous material use, soil and water management, biodiversity protection, waste management, GMO, climate-related requirements Labor related: no discrimination policy, gender-based violence and harassment, forced or compulsory labor, child labor; child protection; freedom of association and collective bargaining; conditions of employment; occupational health and safety
Business Development	Plan for business development; democracy, participation and transparency in the organization; no discrimination

Source: Fairtrade Standard for Small-Scale Producer Organizations V 2.1. Fairtrade International.

Under the Fairtrade certification system, minimum prices or premiums to be paid on the certified products are clearly set. For instance, dry turmeric yields 15% of the market price in world wide trade, excluding India and Sri Lanka. The minimum prices and premiums to be paid for other certified products are found on the website of Fairtrade International²⁸. This database could also be referred to when deciding whether or not certification economically makes sense. The application cost for a small farmer organization comprised of 100 individual producers with one processing unit of single commodity is estimated to be 2,900 Euros, while re-registration for renewal is estimated at 1,800 Euros from the second year onward²⁹. In India, Fairtrade India offers guidance for applicants and facilitates the marketing of certified products³⁰.

3.5.2. Government Schemes/Programs, NGOs, International Organizations in Implementation of CSR Interventions

CSR interventions are often implemented through NGOs. "The CSR Report of India 2019" indicates that nearly 34% of the surveyed companies work with NGOs, government departments, and jointly with other companies, while 11% implement interventions through their own organizations. The table below summarizes the NGOs engaged with the CSR projects which were identified while reviewing the CSR reports of various companies. This is not intended to be an exhaustive list³¹.

Table 3.22: NGOs and Other Organizations Engaged in CSR Projects

Name	Location of the Organization	Key Development Interventions
Livelihood/skills training/community development		
SEWA Rural	Gujarat	Community development, livelihood, women's empowerment
BAIF	Gujarat	Implementation of CSR projects (women's empowerment, livelihood)

²⁸ <https://www.fairtrade.net/standard/minimum-price-info>

²⁹ In case the members are comprised of groups of individual members, the cost increases. (<https://www.flocert.net/solutions/fairtrade-resources/cost-calculator/>)

³⁰ Business development section of the organization can be contacted. (www.fairtradeindia.org)

³¹ Fairtrade Minimum Price and Premium Database User's Guide (https://files.fairtrade.net/standards/280410_Database_Users_guide.pdf)

Name	Location of the Organization	Key Development Interventions
SEEDS	New Delhi	Disaster relief, rehabilitation, environment sustainability, water and sanitation, skills development
MARG Education	Various locations	Training on accounting, IT literacy
Vivekananda Institute of Vocational and Entrepreneurial Competence	Vadodara	Community development, natural resource management, livelihood, skills training, education
Forest/Wildlife/Environment/Alternative Energy		
GEER Foundation	Gandhinagar, Gujarat	Supporting eco-clubs in schools
Gujarat Ecology Commission	Gandhinagar, Gujarat	Facilitating CSR activities on mangrove conservation
SEWA	Gujarat	Implementation of CSR projects (community development, livelihood, women's empowerment)
BAIF	Gujarat	Implementation of CSR projects (women's empowerment)
WWF India	New Delhi	Snow leopard and human conflicts in Arunachal Pradesh, community tourism
TERI	New Delhi	Distribution of Solar Lamps

Source: JICA Study Team (2019) compiled from interview results, CSR information available from websites.

3.6. Preliminary Review of PPP in Forestry Sector in Gujarat

3.6.1. PPP: Overview

(1) Advantages and Disadvantages

Public Private Partnership (PPP) is a way of providing services by public entities which engage private firms based on a contract. The advantages of PPP are the minimization of public expenditure, provision of better quality services and prompt service provision. This mode of project can be adopted in various sectors, such as transportation, energy, health, the social sector, and in training/capacity building. In India, PPP projects can be initiated by the central or state government following the relevant procedure. During the construction and operation stage, stringent monitoring of the engaged firm is required by the public agency (the contract owner), which requires an adequate capacity³²

(2) Mode of PPP

The main types of PPP implementation can be broadly grouped into 1) management contracts; 2) Build-Operate-Transfer (BOT), and 3) lease contracts. Each modus operandi also reflects the varying degrees of risks that the public-private partners share.

³² PPP Guide for Practitioners (2016), PPP Cell, Department of Economic Affairs, Ministry of Finance, Government of India

Table 3.23: Main Types of PPP Projects

Mode of PPP	Description	Risk Levels at Various Stage*	Variations
Management Contracts	<ul style="list-style-type: none"> Engage a private firm for management of various activities Short duration (3-5 years) Task specific and focus on inputs Ownership of assets: public entity 	Public: D, F, C, O Private: O&M	<ul style="list-style-type: none"> Basic management-for-free contract: all risk retained by the public entity Management contract with performance incentives: some risk retained by the contractor Management and finance contract with rehabilitation and expansion: financial and management risks for a volume incentive by the contractor
Build-Operate-Transfer (BOT) and Other Variations (including BOOT, DBFOT)	<ul style="list-style-type: none"> For development of new assets (could be rehabilitation/extension of existing assets) Requires a large scale investment from outside All risks for the private sector – significant 	Public: Partly O Private: D, F, C, O&M	<ul style="list-style-type: none"> DBO (Design-Build-Operation): Design, construction, operation, O&M by the private partner. Procurement of funds for asset development by the public. DBFOT (Design-Build- Finance-Operate-Transfer): a comprehensive package of engagement by the private sector during the lease term. Upon completion of the lease term, the assets transferred to the public entity. BOOT (Build-Own-Operate-Transfer): during the operation, the assets belong to the private partner. Nearly equal to BOT. Other
Lease Contracts	<ul style="list-style-type: none"> Asset is leased to the private entity. Med-term contract Possible capital investment to certain extent by the private partner Public entity will not pay fees to the private partner. Private partner charges the fees to the consumer and part of the collection will be shared with the public entity. 	Public: Partly F, C and entire risk of ownership Private: D, part of F,C, entire O&M	<ul style="list-style-type: none"> Depending on the timing of the transfer of the assets to the public entity, the following variations of the lease contracts are seen: BLT (Build-Lease-Transfer) BOLT (Build-Operate-Lease-Transfer) BTL (Build-Transfer-Lease)

*D: Design; F: Finance; C: Construction; O&M: Operation and Maintenance; O: Ownership

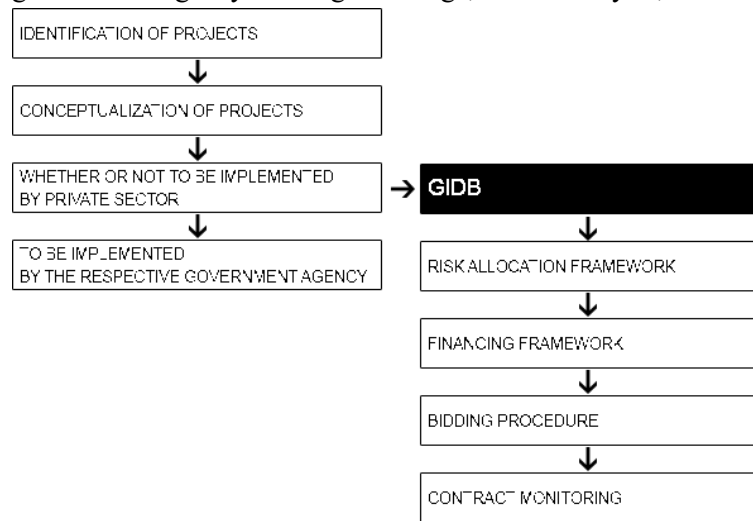
Source: PPP Guide for Practitioners (April 2016). PPP Cell, Department of Economic Affairs, Ministry of Finance, Government of India.

(3) PPP Project Cycle (An Example of GIDB)

The Gujarat Infrastructure Development Board (GIDB), a nodal agency for PPP in Gujarat, adopts the PPP project cycle as in the figure immediately below. Project identification and conceptualization are to be undertaken by the concerned government agency. During this stage, needs analysis, and feasibility studies along with social and environmental safeguard studies are to be carried out.

Once the identified projects are to be implemented through PPP mode, the GIDB will assist the public entity in identifying the risks and financial viabilities and provide other necessary guidance to the concerned government agencies.

Further, the roles and responsibilities of the entities engaged in the contract shall be clearly defined and the capacities shall be assessed.



Source: <http://gidb.org/about-us-project-life-cycle>

Figure 3.10: PPP Project Life Cycle of the GIDB

3.6.2. PPP in India

(1) PPP Projects in States

The PPP cell of the Ministry of Finance, Government of India identified 1,886 PPP projects with a total investment of 25.7 trillion INR since 2011 (data as of 12th August 2019). Out of the total number of PPP projects, 844 were identified to be road and bridge sub-sector and renewable energy (grid) sub-sector (353) projects. Among the states, Maharashtra had the highest number of PPP projects (234 projects) followed by Madhya Pradesh (194 projects) and Rajasthan (175 projects).

In Gujarat, 134 projects have been undertaken since 2011, of which the sub-sector of roads and bridges accounts for 47 projects, followed by 25 port projects and 18 urban transportation projects. Other sub-sectors include solid waste management (9 projects), sewage treatment and disposal (7 projects), renewable energy (9 projects), and tourism (4 projects).

(2) PPP Projects by Type³³

As seen in Section 3.7.1, there are different modes of PPP. Common types of PPP, out of the total number, include Annuity Build-Operate-Transfer (BOT) (525 projects), Build-Own-Operate-Transfer (BOOT) (323 projects) and Design-Build-Finance-Operate-Transfer (DBFOT) (203 projects). BOOT was a common form of PPP in renewable energy sub-sector. At the same time, out of the total number, 49 tourism sector PPP projects were identified. The most common mode of these PPP projects was BOT (19 projects), followed by DBFOT (13 projects).

(3) PPP Projects by Central Government and State Government

Of these PPP projects, 70% were implemented by state governments and the rest by central

33

[https://www.pppinindia.gov.in/infrastructureindia/project-list?id=1&searchType=Government%20Infrastructure%20Projects%20\(PPP\)](https://www.pppinindia.gov.in/infrastructureindia/project-list?id=1&searchType=Government%20Infrastructure%20Projects%20(PPP))

government entities. Among the state-implemented PPP projects, roads, bridges and renewable energy account for the 60%, whereas 70% of the central government-implemented projects were roads and bridges. Telecommunication networks and services are exclusively implemented by the central government (60 projects). PPP projects for some of the sub-sectors, such as tourism, education, solid waste management, water supply pipelines, are undertaken only by states.

3.6.3. Nodal Agencies and Applicable Laws in India and in Gujarat

(1) Central Government of India

PPP with the Government of India needs to follow the “Guidelines for Formulation and Appraisal and Approval of Public Private Partnership (PPP) Projects” issued by the Cabinet Committee on Economic Affairs. Project identification is initiated by the concerned ministry or Central Public Sector Undertakings, will carry out the preparation of feasibility studies and other necessary documents. After the approval of the Public Private Partnership Approval Committee, an expression of interest can be announced to proceed further.

(2) Gujarat Infrastructure Development Board

Gujarat issued the Gujarat Infrastructure Development Act in 1999, which was the very first act on PPP in India. By the act, the GIDB was established to facilitate infrastructure development through PPP. Since 2009 it has functioned as a regulatory body of special investment regions of the state.

3.6.4. Projects related to Forestry/Biodiversity

(1) Projects from the PPP Database of DEA

Out of the 47 tourism PPP projects, selected cases have been chosen which may have relevance to the Project.

Table 3.24: Outline of the PPP Projects Relevant to the Project

State	Project Name	Type of Contract	Project Authority	Description
Gujarat	Development of Triangle portion of the Lakota Lake, Jamnagar	BOT	Jamnagar Municipal Corporation	Pre-construction stage. Area: 45,000 sq. m Concession duration: 180 months Project cost (agreed): 450 million INR
Gujarat	Amusement Park (Kankaria Balvatika)	BOT	Ahmedabad Municipal Corporation	O&M stage Agreement signed: Oct 2012 Development of amusement park in Ahmedabad Concession duration: 240 Project cost (agreed): 320 million INR
Andhra Pradesh	Mrugavani National Park, Chilkur Eco-Tourism Project	DBFOT (Toll)*	Andhra Pradesh Forest Development Corporation Limited	Agreement signed: Nov 2010 Concession duration: 396 months Project cost (agreed): NA
Madhya Pradesh	Eco Tourism Park - Rewa	BOT	Madhya Pradesh Ecotourism Development Board	Under construction Concession duration: 360 months Project cost (agreed): 156.8 million INR
Assam	Operation and Maintenance of North East Tribal Museum and	BOT	Cultural Affairs Department, Government of Assam	Under construction Area: 90 acres Agreement signed: Oct 2014 Concession duration: 180 months

State	Project Name	Type of Contract	Project Authority	Description
	Cultural Centre at Nazirakhat, Sonapur, Kamrup (M), Assam			Project cost (agreed): 100 million INR

*Toll revenue is taken as the main funding component of the project especially O&M.

Source: PPP Project Database, Department of Economic Affairs, Ministry of Finance, Government of India³⁴

(2) Projects Advertised by the GIDB

PPP projects can be formulated for various sectors, such as ports, power, transportation, water supply, industrial parks, tourism, education, and health, as in the Gujarat Infrastructure Development Act of 1999. Although no forestry sector-related project was proposed, some tourism sites were already developed under PPP mode, including a coastal tourism site on Pirotan Island (100 million INR investment potential) and a maritime museum in Junagadh district (100 million INR investment potential). Two ecotourism projects have also been proposed: one in Idar, Vijayangar, and Polo (20 billion INR of investment) and another in Saputara Hill Station (1.9 billion INR investment).³⁵

(3) Parks Developed under PPP Projects in Japan

Two cases of park development PPP projects in Japan are taken from the secondary sources.

Table 3.25: Japanese Parks Developed under PPP

Location*	Project Name	Type of Contract	Project Authority	Description
Yokosuka City, Kanagawa	Nagai Umi no Te Park Development Project	BTO & BOT	Yokosuka Municipal Office	<ul style="list-style-type: none"> The very first integrated recreational park project in Japan under Private Financing Initiative. Park infrastructure, such as restaurants and spa facilities were constructed by the Yokosuka Municipal Office, which handled costs. Project commencement: 2002 O&M duration: 10 years Contract amount (agreed): approximately 7.6 billion JPY (before tax)
Ibusuki City, Kagoshima (** Further elaboration below the table.)	Ibusuki Regional Recreation Centre	BTO	Ibusuki Municipal Office	<ul style="list-style-type: none"> Design, build, O&M of the regional recreation center. The facilities include a park, <i>Michi-no-eki</i> (shop for local specialty produce and products) restaurant, bakery, and fast-food shops. 20-40% of the sales of souvenirs and other goods were given to the PFI partner as incentives for further increments in the sales. The regional center provided space for the local communities to further develop local specialty produce and for students to take part in the business activities.

³⁴

[https://www.pppinindia.gov.in/infrastructureindia/project-list?id=1&searchType=Government%20Infrastructure%20Projects%20\(PPP\)](https://www.pppinindia.gov.in/infrastructureindia/project-list?id=1&searchType=Government%20Infrastructure%20Projects%20(PPP))

³⁵ <http://gidb.org/tourism-project-opportunities#01>

Location*	Project Name	Type of Contract	Project Authority	Description
				<ul style="list-style-type: none"> • Project commencement: 2003 • Contract amount (agreed): approximately 360 million JPY

* Location map of these projects are given in Annexure 3.9.

Source: Cabinet Office, Government of Japan³⁶

In the case of the Ibusuki Regional Recreation Centre, the initial request was placed by an agricultural cooperative which needed to expand its sales. Further, the local fisheries industry also requested a place to sell their products. The local chamber of commerce and city assembly also requested a space and facilities where local producers could showcase and sell their products. Accordingly, the Ibusuki municipal office reviewed the requests from the stakeholders and undertook a study to assess the feasibility of the project and to identify a suitable financing/implementation mechanism.

As a result, Private Financing Initiative (PFI) was identified as a suitable mode of implementation. The Ibusuki municipal office's experience indicates that the assessment of the demand was crucial while assessing the applicability of PFI. Thus, the economic viability of the planned facilities (i.e. restaurants, bakeries, etc.) was carefully assessed. Accordingly, the operation and management plan was worked out³⁷.

³⁶ https://www8.cao.go.jp/pfi/pfi_jouhou/jigyou/jireisyu/pdf/jireisyu_5.pdf

³⁷ This paragraph is based on the case study given by the Cabinet Office, Government of Japan. Original text in Japanese. Translation and extraction by the author. https://www8.cao.go.jp/pfi/pfi_jouhou/tebiki/jirei/jirei18_01.html

Chapter 4. Review of the Detailed Project Report (DPR)

4.1. Outline of the DPR

The Detailed Project Report (DPR) was prepared by the Gujarat Forest Department (GFD) and submitted on March 5, 2019. This report consists of ten chapters (Table 4.1) followed by relevant annexures.

Table 4.1: Table of Contents of the DPR

PART I: State and Development of the Study Area	
Ch. 1	Introduction
Ch. 2	The State of Gujarat (Study Area) at Present
Ch. 3	Forests and Wildlife – Current Assessment
Ch. 4	Assessment of JICA Funded GFDP I and GFDP II
Ch. 5	GFDP I and GFDP II – Obstacles, Achievements and Opportunities
PART II: Proposal of GFP-EA	
Ch. 6	Aims and Scope of GFP-EA
PART III: Implementation of GFP-EA	
Ch. 7	Main Component: Coastline Management
Ch. 8	Main Component: Human-Wildlife Conflict
Ch. 9	Main Component: Fragile Ecosystem Management
Ch. 10	Technology Innovations

Source: DPR

4.2. Methodology of the Review

Prior to the Study, the DPR was initially examined as a part of domestic work done in Japan in order to understand the overall picture of the Project. After the first and second field surveys, which included a series of discussions with the GFD and other relevant agencies, as well as field visits, the DPR was reviewed again based on outcomes from these field surveys. In addition, (1) GIS and MIS, (2) Livelihood and CSR/Private Partnership, (3) Institutional Arrangement, and (4) JICA-funded GFDP I and GFDP II regarding (1) and (2) were further examined.

4.3. Review of the DPR

4.3.1. GIS and MIS

For GIS and MIS, the DPR emphasized the importance of technological innovation to improve the capacity of the GFD and the efficiency of its work. More specifically, the DPR covered needs for the (1) Expansion of existing capabilities/resources, (2) Hardware upgrade, and (3) Extensive skill enhancement (Table 4.2). Based on findings from the field surveys, the needs and activities appear mostly appropriate in the context of the GFD.

Table 4.2: Needs and Proposed Activities and Objectives in Technology Innovation

No.	Needs	Activities	Objectives
1	Expansion of existing capabilities/resources	Enhancement of existing GIS/MIS system	To increase efficiency of standard operating procedures.
		Development of GIS-based workflow	
2	Hardware upgrade	Distribution of 2,000 portable electronic tablets	To increase efficiency of data flow from and to field staff.
		Acquisition of sensor-	To achieve the saving of manpower,

No.	Needs	Activities	Objectives
		equipped drones and image processing technologies	accurate monitoring, and tracking of illegal activities related to wildlife management.
3	Extensive skill enhancement	Refresher training courses for new technologies	To impart knowledge and skills about drones and mobile applications.

Source: JICA Study Team (2019) based on the DPR

On the other hand, though the DPR proposed to enhance existing capabilities and resources, the current capacity of the GFD was not discussed in detail. The DPR review also found that although the introduction of new technologies, such as drones with various types of aircraft and sensors, was extensively explained, it seems necessary to further examine current issues and specify how to utilize these new technologies, in consideration of the following needs.

(1) Examination about Existing Capabilities and Resources

The DPR stated that existing capabilities and resources should be enhanced, and it is true that these capabilities and resources play an important role in the implementation of the Project. As discussed in Chapter 2 of the F/R, a variety of satellite imagery and equipment, including hardware and software, were procured through the past projects, and maps and GIS data layers were also produced using the satellite imagery. The field surveys also found that the GFD has collaborated with different agencies such as GIPL and BISAG for MIS development and GIS integration, as well as for updating GIS data. Although these data and information are owned by the GFD and usable for the Project, such usable data and information are still managed in different media, such as servers and portable hard disk drives, at different agencies. The DPR does not discuss in detail existing capabilities and resources, nor does it discuss relevant agencies. In this regard, the inventory of available data and information and the division of roles between key agencies should be addressed.

(2) Specific Use Cases of New Technological Innovation

In Chapter 10 of the DPR, technological innovation is discussed, giving examples of various kinds of equipment, such as drones and mobile applications. For instance, the DPR mentions that drones can be utilized with different sensors for various purposes such as monitoring the plantation process, wildlife movement patterns, and illegal activities. However, drone usage scenes appear overall to be general. In the same manner, though the DPR recognizes the importance of enhancing existing capabilities and resources, the availability of an MIS system and various spatial data are not discussed well. For example, new MIS and GIS modules will be developed based on examinations of the existing MIS system. Satellite RS will be utilized for the prioritization of mangrove plantation areas. To enhance the capacity of the GFD and efficiently improve its work, therefore, it is important to reexamine issues to be addressed and their priority, and to develop specific usage scenes of new technologies.

4.3.2. CSR/Private Partnership

In the DPR, a paragraph in the Project Management section indicates that CSR can be incorporated into the Project implementation process. Although no further details were provided in the DPR, CSR/Private Partnership in the Project is highly relevant. As seen in Chapter 3, CSR funds can be used to improve green cover and mangrove conservation, and a substantial sum has been invested in livelihood related activities so far.

4.3.3. Institutional Arrangement

(1) GIS and MIS

For the GIS and MIS capacities of the GFD, the DPR did not discuss institutional arrangements in detail. Based on outcomes from the field surveys, Chapter 2 of the F/R summarizes the availability

of data and equipment, and the human resources of the GFD IT Cell and GIS Cell, GEER GIS Section, and Sasan Gir GIS Lab.

To enhance the capacity of the GFD, it is also necessary to strengthen the human resources of the GFD. At the introduction of new technologies, specialized experts (e.g. drone experts) need to be hired for Project implementation; moreover, considering the limited capacity of the GFD, not only regular government staff, but also contractual staff and outsource staff, need to be appropriately placed. At the same time, capacity development, which is important for institutional strengthening, needs to be examined well. For the GFD, because of the large number of field officers, as well as their different levels of experience and knowledge, it is important to conduct needs analysis in advance for a correct understanding of their current situations.

For monitoring and evaluation, though the Project is the third Japanese ODA Loan project in the state, it is possible that there is room for improvement regarding the monitoring system, considering the involvement of several different agencies. In the DPR, the importance of having a sound monitoring and evaluation system is recognized, and it proposes to have a GIS-enabled system in place and also prepare Standard Operating Procedures (SOP). At the beginning of the Project, formats will be developed for periodic monitoring to track physical and financial progress.

(2) CSR/Private Partnership

No institutional capacity development program for CSR/Private Partnership was proposed in the DPR. Furthermore, how CSR/Private Partnership is to be facilitated and an institutional arrangement for implementation were not provided in the document.

4.3.4. JICA-Funded GFDP I and GFDP II

(1) GIS and MIS

While GFDP I intended to increase forest cover with an extensive tree plantation program across the state, GFDP II aimed at alleviating poverty in the rural communities while improving forest cover, grassland productivity, and reviving coastal mangrove with enhanced people's organizations. In both phases, GIS and MIS contributed to project interventions in a cross-sectoral manner. Findings from GFDP I and II and lessons learnt for the Project are reviewed as shown in Table 4.3.

Table 4.3: Review of Findings in GFDP I and II and Lessons Learnt in GIS and MIS

Theme	Findings from GFDP I and II	Lessons learnt from GFDP I and II
Data Collection	<ul style="list-style-type: none"> • The roles of JFMCs were mostly limited to patrolling and monitoring the forests to protect them from fire, theft, and trespassing. • Beat and Round level data were recorded in a paper-based or verbal form during GFDP I. The data filling system was also inconsistent. • Prior to GFDP I, only internal monitoring mechanisms such as physical verification and sample check were conducted. 	<ul style="list-style-type: none"> • Recording of locations of Soil and Moisture Conservation structure in GIS maps is critical. • Drone surveillance system equipped with night-vision and automated reporting for wildlife management should be established. • Training in new management approaches and increasing availability of ICT equipment can improve the information flow between the field and headquarters. • Drones can enable the GFD for effective aerial monitoring and data collection for governance and decision-making.
Training Programs	<ul style="list-style-type: none"> • Computer training was provided to selected GFD staff. • Foundation and refresher courses 	<ul style="list-style-type: none"> • Training should be extended to a larger group of people.

Theme	Findings from GFDP I and II	Lessons learnt from GFDP I and II
	<p>had to be conducted for staff and communities.</p> <ul style="list-style-type: none"> Regular training for operating MIS has been provided to GFD staff and officials. 	
Project Management	<ul style="list-style-type: none"> A Training, Research and Orientation (TRO) wing was established for the implementation of GFDP I. The establishment of an IT Cell along with the integration of MIS and GIS was an effective step at PMU level and greatly improved data collection and more efficient monitoring (data for all JFMCs, SFDCs and EDCs were integrated at the MIS.). Limited resources to equip the entire GFD with compatible ICT equipment slowed the integration of new technologies. The introduction of new communication technology changed staff members' work performance. This change also made it possible for the staff members to conduct map making internally. 	<ul style="list-style-type: none"> More comprehensive ground level data such as tree plantation activity should be integrated with GIS for improved monitoring. Smart phone/tablet use has great potential to substantially improve information and data flows.

Source: JICA Study Team (2019) based on the DPR

These findings and lessons learnt from the past two phases will be helpful to design the project activities and should be incorporated into the Project formulation.

(2) CSR/Private Partnership

In GFDP II, CSR/Private Partnership was utilized for skills training for livelihood activities, but not for ecosystem management related activities. This was not done in a planned manner, but was rather done at the initiative of project staff or through the resource organization engaged by GFDP II.

In the table below, the livelihood activities undertaken in the GFDP II are reviewed based on the available reports and field visits.

Table 4.4: Review of Livelihood Activities in GFDP II and Lessons Learnt

Theme	GFDP II	Lessons to be learnt from the field
Livelihood	<ul style="list-style-type: none"> Implementation of Income Generation Activities (IGAs) (i.e. organic certification of custard apples, spice processing, vegetable cultivation) Facilitation by resource 	<ul style="list-style-type: none"> Clusters like Visdalia (Surat District) continue to be assisted by the GFD after the completion of the project. The duration of support for cluster-based IGAs goes beyond mere start-up support but is long term. The cluster members agreed that the facilitation is crucial for the success and sustainability of the cluster-based activities. Building the capacity of woman leaders leads to success and sustainability of the SHGs. The market linkage (i.e. Reliance Fresh) was done by the resource organization/person engaged and helped sustain the IGAs. Buyers of the produce were identified unsystematically. The organic and wild produce was not necessarily sold to

Theme	GFDP II	Lessons to be learnt from the field
	<ul style="list-style-type: none"> organizations for marketing • Revolving fund managed by JFMCs for SHGs to take up IGA promotion • Awareness of financial services and habit of savings 	<ul style="list-style-type: none"> the buyers who see the value of the produce. • Renewal of organic and wild certification was not done in the post-project period where facilitation by the project personnel was no longer available. The renewal procedure was complicated and JFMC members could not manage to do so on their own. The cost of renewal could also be an issue. • Simple grading of the produce and primary processing could have contributed to fetch a fair price. • No training on sustainable harvesting techniques was done for MFPs, which raises a concern about the potential exploitation of the forest resources.
Capacity Building for Livelihood	<ul style="list-style-type: none"> • SHG members were trained in business plan preparation, skills for IGAs • CSR (Adani) assisted skills training 	<ul style="list-style-type: none"> • CSR funding can be accepted for training activities. • Investable project proposals need to be prepared by the project.

Source: DPR I; Completion Report – GFDP II, field findings during the first field survey

4.4. Concluding Observations

Of all the chapters and annexures of the DPR, those relevant to such themes as (1) GIS and MIS, (2) Livelihood and CSR/Private Partnership, (3) Institutional arrangement, and (4) JICA-funded GFDP I and II were particularly reviewed based on the preliminary analysis, as a part of the first domestic work done in Japan, as well as the field surveys in India. Although the major part of the DPR was agreed upon by the study team, further discussion with the GFD and other relevant agencies is still needed, as is, accordingly, improvement of the contents of the DPR.

1) GIS and MIS

The DPR covered major project components as well as activities relevant to each component. The need for the provision of training for capacity development and the introduction of new technologies such as drones and tablets was also understood from the findings and the lessons learnt from the past JICA-funded projects. Based on the outcomes from the Study, contents regarding equipment, human resources, and implementation structure will be further elaborated, and usage scenes of new technologies will be specified, for the smooth and meaningful implementation of proposed activities.

2) CSR/Private Partnership

a. CSR for Afforestation and Mangrove Conservation

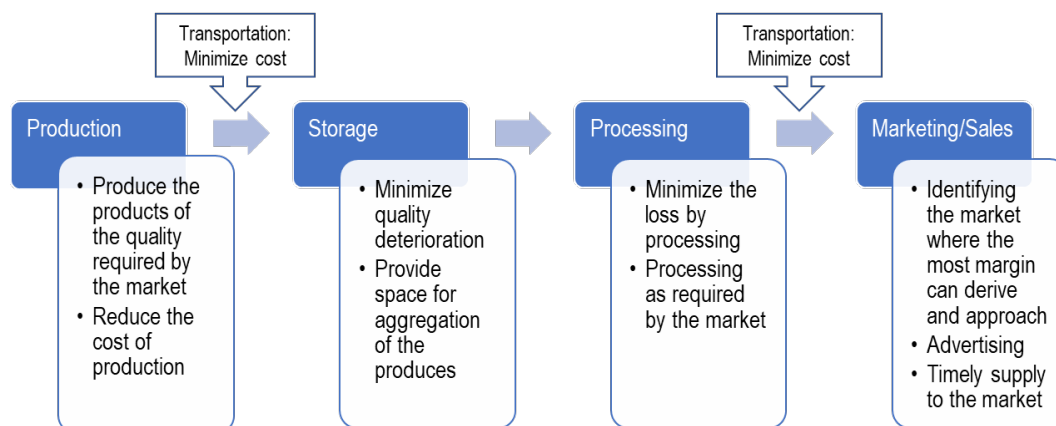
As reviewed, there has been no specific proposal made in the Project for afforestation and mangrove conservation under CSR/Private Partnership. However, this does not mean that there is no need for it. So far, the number of afforestation and mangrove projects under CSR/Private Partnership is still low. Such projects are also implemented in an unplanned way, which is less effective from the ecosystem management perspective. As for mangroves, the GEC provides technical guidance to interested private parties on an on-demand basis, whereas there is a lack of an enabling environment for CSR/Private Partnership-based afforestation in Gujarat.

To facilitate the afforestation under CSR/Private Partnership, the Project provides an opportunity for the GFD to initiate such interventions. Appropriate institutional arrangements and modus operandi still need to be further elaborated in the Project document.

b. Private Partnership for Making Supply Chain Responsible

From the review of livelihood interventions under GFDP II, it was determined that planning was done from the producer’s perspective and thus identification of the right buyers was met with challenges. In reality, not all buyers value the certified produce, especially in the local market. As seen in Chapter 3, companies that have certification export produce to the markets where such certification is required. This leads us to revisit the production and marketing strategy adopted by the GFDP II.

For implementing profitable livelihood interventions, multi-faceted issues are to be dealt with. This can be understood well by looking at the value chain of the produce dealt with by JFMC/EDC/SHG. At each stage of the supply chain, value can be generated by addressing the issues.



Source: JICA Study Team (2019)

Figure 4.1: An Indicative Value Chain of JFMC/EDC/SHG Produces

Based on the value chain analysis as in Figure 4.1, the resources required for upgrading the value chain of JFMC/EDC/SHG produce are shown in the table below. The table shows that not only technical issues to be addressed but also that the capacity of organizational management needs to be strengthened.

Table 4.5: Resources Required for Upgrading Value Chain

Activities	Production	Transportation/ Storage	Processing	Marketing/Sales	Sources of Assistance	
Required Resources	Physical Inputs	Equipments Quality seeds Farm Inputs Land Water	Storage space Vehicles	Equipments Packing machine Work space	Web infrastructure	Corporates
	Technical Requirement	Production skills	Post harvesting technology	Processing skills Package design	Market analysis Networking	
	Financial Requirement	Star-up capital Working capital	Cost of storage space and O&M Cost of transporting produces	Cost of equipments Cost of packing materials	Cost of market research Cost of communication	
	Human Resources	Trained workers Knowledge of market requirement	Trained workers	Trained workers	Marketing specialist IT & Communication Specialist	
Management	Production Planning Organizing producers/collectors Supervision/management of the production, storage, processing Technical training/specialized technical inputs Financial management Quality Assurance/Monitoring Strategic marketing/Networking				NGOs/Individual Specialist	

Source: JICA Study Team (2019)

Based on the analysis shown in the table above, corporates can contribute to improve the entire value chain by investing in infrastructure, providing technical guidance, and marketing, while management support can be given by NGOs or individual specialists. In the table below, the roles of each party are outlined.

Table 4.6: Indicative Roles by the Private Partners in Improving Value Chain

Stakeholders in Value Chain	Contribution in Strengthening the Value Chain
Corporates (Buyers)	<ul style="list-style-type: none"> • Investment in infrastructure, physical inputs, providing technical inputs • Buy-back arrangement
NGOs/Individual Specialist	<ul style="list-style-type: none"> • Technical training and guidance • Organizational management • Record keeping • Quality Control by monitoring the value chain

Source: JICA Study Team (2019)

Inputs from the individual specialist could be highly relevant in case the JFMC/EDC/SHG aims for the export market. For instance, a consultant specialising in organic produce and exports could provide useful guidance on the market requirements of the targeted market (i.e. quality, certification, etc.), product development in response to market requirements, and effectively identifying buyers through various exhibitions, networking and advertisement. The specialist engaged could also help corporates communicate their requirements (i.e. compliance with certain standards in production and processing, quality, etc.) to the producers and could also facilitate discussion between two parties on buy-back arrangements. NGOs can be engaged during the entire process in organizing producers, assisting them in production activities, organizational management, and liaising with the specialist and corporates. The advantage of engaging NGOs is that they can continuously guide the producers.

From the above, if the JFMC/EDC/SHG in the Project intends to obtain certification, as reviewed in Section 3.5 (2) 2), Fairtrade certification could be an option. The process of certification can enhance the value chain as the process of obtaining certification strengthens the value chain.

Chapter 5. Issues Identified from the Field Surveys and DPR

This chapter discusses issues identified from the preliminary review of the DPR and the field surveys in the GIS and MIS and Livelihood/Private Partnership fields.

5.1. GIS and MIS

The review of the DPR and the field surveys found that the target areas of the Project had been selected by component. Changes in the size of target area can largely influence the work of cost estimation and the implementation schedule, as well as institutional arrangement. In this regard, the target areas of the Project, as well as the selection/prioritization criteria, need to be understood in common by the Study team, JICA, and the GFD.

5.2. CSR/Private Partnership

While undertaking the review of the DPR and the field surveys, the following issues have been identified and discussed with JICA and the GFD.

(1) Mobilizing CSR for Greener CSR

Through the field survey, it was understood that CSR resources are mostly channelled towards education and health, as they are the primary area of emphasis of the government. On the other hand, a lack of technical guidance to enable the corporates to carry out environment- and forest-related CSR activities was also seen as a constraint. This, in fact, is an opportunity for the GFD, as a concerned agency, to facilitate afforestation through CSR and bring in more resources for sustainable ecosystem management. In principle, the GFD agreed to further develop afforestation into a component through CSR funds. Further elaboration on the appropriate institutional framework for the component should be given in the detailed scope of work.

(2) Livelihood Activities - Strategic Private Partnership

As reviewed in Chapter 4, in order for livelihood activities to be profitable, services and products to be sold need to respond to market requirements. As seen, the local or regional market in India has yet to become conscious of how the goods and services are produced and procured. Such local market conditions provide an opportunity for producers, especially in tribal areas where the produce is organic by default and there is ready access to wild produce for export. On the other hand, as seen in Chapter 4, the whole value chain of JFMC/EDC/SHG produce needs to be strengthened. The capacity of JFMC/EDC/SHG producers have yet to fully mature. They are in need of intensive support and assured market linkage. Thus, preliminary discussion was held with the GFD and JICA on a pilot project in developing a responsible supply chain through private partnership and agreed to in principle. Further elaboration is provided in the detailed scope of work of the Project.

(3) Bio-Park Establishment in PPP Mode

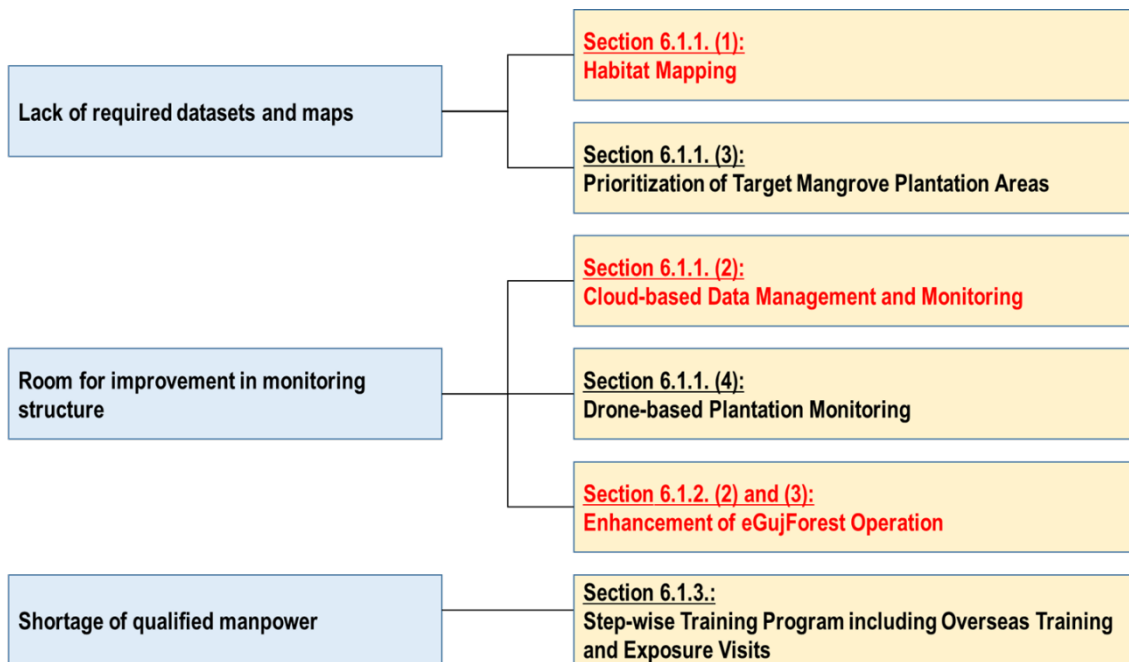
Under the Human-Wildlife Conflict Component (Section 8.1.5.3 in DPR Vol I), two biological parks were proposed. Although the mode of implementation was not mentioned, during the first field survey, the Study team received a request from the GFD to look into the possibility of adopting PPP for the component. In order to assess the applicability of the PPP mode of implementation for the bio-parks, further conceptualization of the parks, the applicable legal framework, profitability including market potential, and other matters need to be examined. Since this is beyond the scope of the Study team, there will be no further discussion of this matter in this report.

Chapter 6. Project Outline and Scope of Work

6.1. Scope of Work for GIS and MIS

GIS and MIS play an important role as an element technology in the three main project components and need to be introduced based on the current needs. At the same time, the GFD has completed a number of projects and owns many data sets. It is also currently developing GIS and MIS applications. Under these circumstances, the Project needs to implement Project activities while considering the existing resources and specifications.

As discussed in Chapter 2, a lack of appropriate datasets and maps, a lack of an effective monitoring structure, and a shortage of qualified manpower were identified as major current issues for the GFD. To address these issues, several activities are proposed. These include four activities that extensively utilize GIS (Section 6.1.1), such as habitat mapping, cloud-based data management and monitoring, prioritization of target mangrove plantation areas, and drone-based plantation monitoring, as well as GIS/MIS enhancement (Section 6.1.2) and capacity development (Section 6.1.3). Figure 6.1 shows the correspondence relations between the identified issues and the proposed activities. In this figure, activities in which Japanese domestic technology³⁸ are incorporated or those that took a hint from Japanese domestic technology are indicated in red.



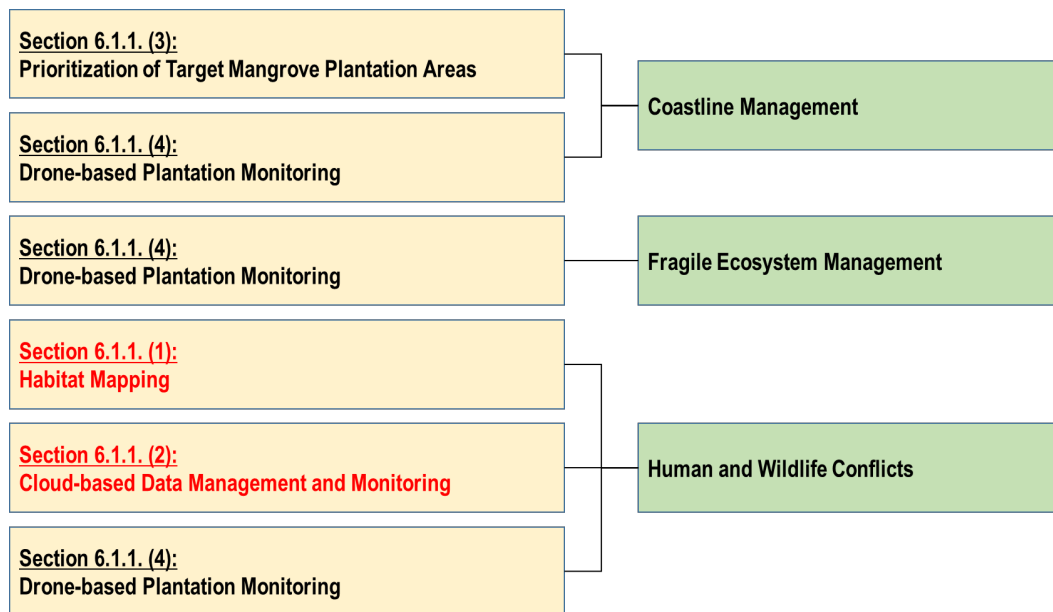
Source: JICA Study Team (2019)

Figure 6.1: Correspondence Relations

Between Identified Issues (Left) and Proposed Activities (Right)

Further, Figure 6.2 illustrates correspondence relations between these proposed activities that extensively utilize GIS and the main components of the Project. In same manner as the previous figure, activities relevant to Japanese domestic technology are indicated in red.

³⁸ In the context of the Study, “Japanese domestic technology” refers to not so much individual element technologies developed in Japan, as a combination of common element technologies selected based on the previous experience.



Source: JICA Study Team (2019)

Figure 6.2: Correspondence Relations

Between Proposed Activities (Left) and Project Main Components (Right)

For the referenced Japanese domestic technology shown in red, a Google Earth Engine (GEE)-based system was proposed by reference to JICA forestry projects implemented in other countries. In the JICA forestry projects in Laos, Vietnam, and Botswana, for example, a GEE-based system was introduced in order to detect deforestation sites based on freely available satellite imagery and deliver the resulting data to field officers. For the Project, it is possible to adjust the specifications according to the Gujarat context. Moreover, archived data of Japanese satellite imagery are also available through GEE. For instance, archived data of ALOS, which is a past Japanese optical satellite, and hourly GSMaP data, which is Japanese global rainfall data, can be also utilized as a reference in the Project.

At the same time, drone-based survey was also proposed using domestic case examples as a guide for the Project. Today, drone-based survey is introduced not only to take aerial photos but also calculate the area and growth amount of forest areas. This implies that drone-based surveys require knowledge and skills about not only drone operation but also the post-processing of data collected using drones. For instance, demonstration experiments for Michibiki, a Japanese quasi-zenith satellite imagery, the JICA forestry project in Papua New Guinea, and domestic forestry projects in Japan utilized drones for calculating the area and volume of forest areas and monitoring the change in growth amount. For more details, Annexure 6.1 also shows examples of referenced Japanese domestic technologies for the proposed activities.

6.1.1. Introduction of Geospatial Technology

(1) Habitat Mapping

One kind of key thematic maps for the Project is a habitat map. To produce habitat maps, individual primary data layers that meet the technical specifications, such as scale and target area, will be developed. Key individual primary data layers required will involve land use and land cover types, including mangrove forest areas, forest density, water bodies, roads, villages and settlement, and topographic features such as slope and contour (Table 6.1). These primary data layers will be combined in accordance with characteristics for target species in the Project and be used as habitat maps.

Table 6.1: Expected Primary Data Layers Necessary for Habitat Maps

No.	Data Layer Type	Target Area	Scale	Method
1	Land use and land cover	Entire Project area	1:10,000	This will be developed from automatic classification and visual interpretation using procured multispectral satellite imagery (LISS-IV).
2	Mangrove	Coastal Area	1:10,000	Same as above This will be extracted from the land use and land cover map.
3	Forest density	Entire Project area	1:10,000	Same as above
4	Water bodies	Same as above	1:10,000	Same as above
5	Roads	Same as above	1:10,000	Same as above
6	Villages/Settlement	Same as above	1:10,000	Same as above
7	Slope	Same as above	1:10,000	This will be generated from digital elevation model (DEM) data (CartoDEM).
8	Contour (2m interval)	Same as above	1:10,000	Same as above

Source: JICA Study Team (2019)

Of all the primary data layers shown in the above table, land use and land cover type data layer plays the most important role in habitat mapping. To produce the land use and land cover data layer, the following four key activities need to be completed.

1) Procurement and Preprocessing of Satellite Imagery

To produce primary data layers, appropriate satellite imagery will be procured. For most primary data layers, multispectral satellite imagery with spatial resolution of 5m or higher will be procured while topographic maps including slope and contours will need the data of a digital elevation model (DEM). Cloud cover needs to be minimized, and considering the time series analysis, observation months will be consistent through the Project period.

2) Ground Truth Surveys

To collect sample data for land use and land cover classification, ground truth surveys will be conducted. In ground truth surveys, foresters and/or persons who are familiar with local forestry will accompany RS/GIS specialists. During ground truth surveys, training data for classification and reference data for accuracy assessment will be collected separately.

3) Classification

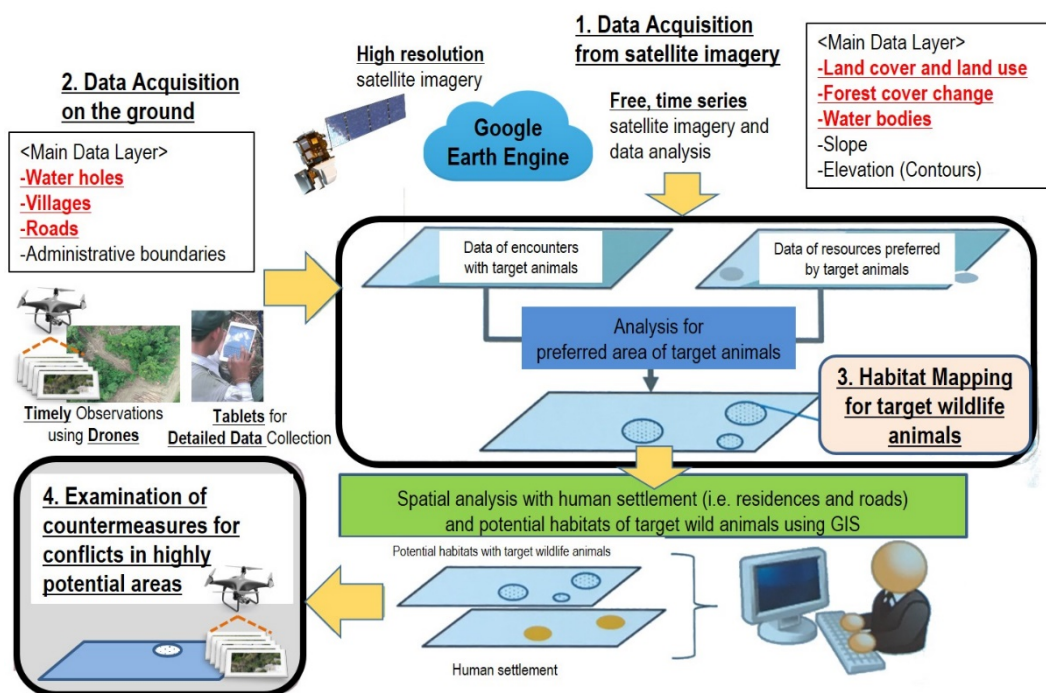
Procured satellite imagery will be appropriately processed, and the necessary analysis will be conducted. For the land use and land cover map and mangrove map, in particular, automatic classification and visual interpretation will be conducted to classify the area into required classes. For the rest, visual interpretation will mainly be conducted to extract specific features.

4) Accuracy Assessment

Using sample data collected during the ground truth surveys, accuracy assessment will be conducted to examine the classification analysis. If the accuracy is not sufficient enough, the maps will be corrected until the minimum requirements are cleared.

In the Project, the entire target area will be divided into two groups by geographical location, and the series of above activities will be conducted in two phases. Maps for the first group (Batch 1) will be completed by the second year, while those for the second group (Batch 2) will be completed by the third year. The grouping and prioritization of forest divisions will be determined after the start of the Project in consultation with the GFD.

Finally, Figure 6.4 illustrates the overall workflow to address human and wildlife conflicts. As discussed above, first, data will be acquired from satellite imagery and ground surveys, and primary data layers will be prepared (Step 1 and 2 on the figure). Second, habitat maps will be created based on the combination of classes relevant to target species on the developed primary data layers. This will need to be validated by existing knowledge and evidences (Step 3). At the same time, potential habitat suitability analysis will be conducted using the primary data layers, the habitat maps, and other relevant spatial information to estimate potential habitats of target wild animals (Step 3). Lastly, countermeasures for human and wildlife conflicts will be examined using the habitat maps and the results of suitability analysis (Step 4).



Source: JICA Study Team (2019)

Figure 6.3: Overall Workflow of Habitat Map Making

(2) Cloud-based Data Management and Monitoring

At present, cloud services are commonly used for efficient data management in various sectors. In order to introduce cloud services and effectively manage data, it is important to understand characteristics of both on-premise and cloud-based environments. Table 6.2 shows the pros and cons of an on-premise server and cloud-based server.

Table 6.2: General Comparison of On-Premise and Cloud-Based Servers

	On-Premise	Cloud-Based
Pros	<ul style="list-style-type: none"> Data files can be managed by specified server (inside the GFD). It does not depend on the conditions of the Internet environment (it can be used even in offline state.). 	<ul style="list-style-type: none"> It is not necessary to purchase hardware, including servers, and software. Operational costs, including costs of human resources and electricity for maintaining and managing hardware and software, hardware management expenses, and security countermeasures, can be reduced. Because it is ready-made and can be used for common purposes, development (customization) of the software may be unnecessary. The latest software is always available, and the workload for maintenance, including upgrading software, can be reduced.
Cons/ Difficulties	<ul style="list-style-type: none"> Software and hardware need to be purchased. 	<ul style="list-style-type: none"> A stable internet environment at all locations is essential. Data files are managed by servers on the Internet (outside the GFD). Depending on usage, high-spec PCs or memory capacity are needed. Because it is ready-made, it is difficult to customize. Payments need to be made periodically regardless of usage status.

Source: JICA Study Team (2019)

All GFD data and applications are hosted at the SDC under the DST³⁹. Currently four servers that are running are hosted at SDC, while eGujForest is run within the intra-network of GSWAN. While official data are maintained on the on-premise servers at SDC, cloud services will be additionally utilized for the Project. In particular, Google Earth Engine (GEE) will be introduced to search open source satellite imagery, process and analyze the imagery, and output the analysis results to be downloaded at later time. At the same time, Google Cloud Platform will also be introduced to manage data downloaded from GEE, and these large volumes of less sensitive data will be stored in the cloud separately from sensitive data at SDC. To convert the cloud-based data into data usable in the on-premise environment and store the converted data, a new inbound data server will be installed. For monitoring, relevant data at SDC and on Google Cloud Platform will be used in combination through the internet, and necessary information distributed to PCs and tablets at local offices. This will allow field staff to monitor urgent issues in a timely manner. Figure 6.5 illustrates the overview of cloud-based data management and monitoring.

³⁹ Draft IT Action Plan for the GFD

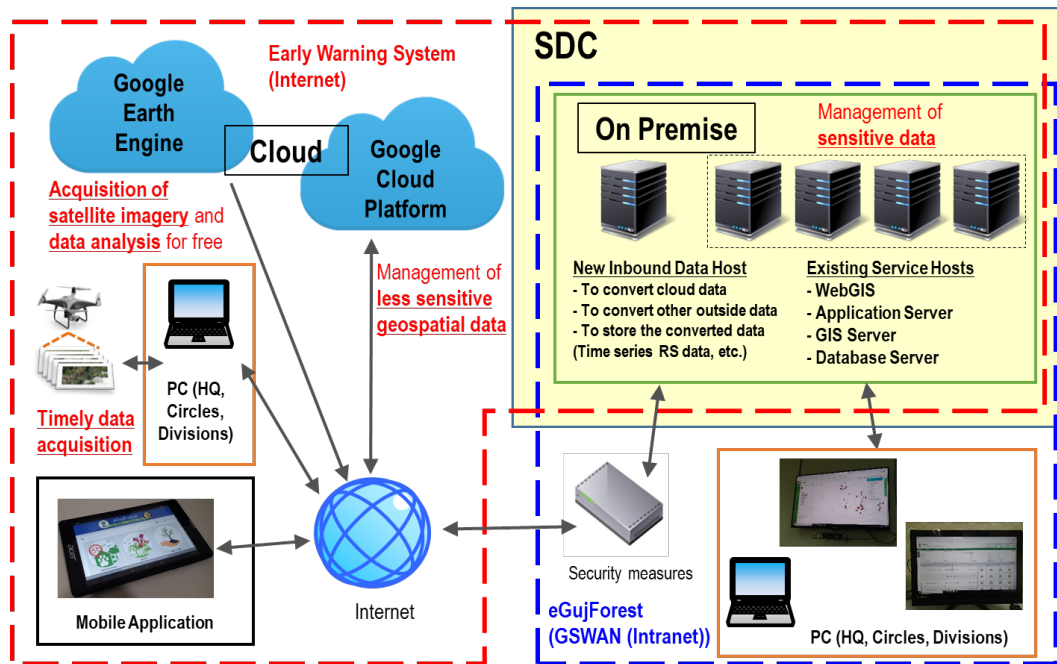


Figure 6.4: Introduction of Cloud-based Data Management and Monitoring

To achieve this data management system, the following activities need to be completed. In this regard, the following case example of GEE illustrates the basic work items.

1) Registration of Google Cloud Services

To utilize Google Cloud Services including Earth Engine and Cloud Platform, it is first required to create a user account and sign up. For this, users will go to a designated web page (Signup for Earth Engine⁴⁰) to become an authorized user. Once authorized, the user will start Code Editor⁴¹ to write codes for calling the Earth Engine API on GEE.

2) Import Data for Analysis (Satellite Imagery and Statistical Data)

Satellite imagery will be acquired by searching through the Earth Engine Data Catalog⁴². Other existing feature datasets, such as international census, watersheds, and protected area boundaries, are also available through the Data Catalog. At the same time, users will upload imagery data or other geo-referenced raster datasets in GeoTIFF format, up to 10 GB in size, from their local storage to the designated folders in the Google environment.

3) Develop and Run Data Processing Programs

Algorithms for georeferenced imagery and vector data stored in the Google environment will be developed and run in the Earth Engine. The Code Editor is available as an interactive environment for developing Earth Engine applications. Users will develop and run Earth Engine applications using the Code Editor.

4) Server Equipment Procurement and Setting up of Server for Data Conversion

In order to share the data of cloud-based analysis results in the on-premise environment, a separate server exclusively for data conversion and sharing will be installed. This separate server plays an important role to convert the file type of cloud-based data in accordance with the existing system setting, store the converted data, and distribute the data to the existing system. This will also make it

⁴⁰ <https://signup.earthengine.google.com/>

⁴¹ <https://code.earthengine.google.com/>

⁴² <https://developers.google.com/earth-engine/datasets>

possible to reduce the cost for storing cloud-based data and further accept data managed by external organizations.

5) Download Analysis Results Data to SDC Servers

Processed data and analysis results data will be downloaded to servers hosted in the SDC in order to make the data available in the existing system. For the SDC side, a new module for the visualization of GEE analysis results data will be developed, and the training for its operation and maintenance will be provided. On the other hand, while maintenance fees are not required for GEE, cloud management fees for storage space to save GEE analysis results data will be required. Because this will vary depending on the volume of data, the cost will be estimated in advance by the Project Management Consultant (PMC) in consultation with the PMU.

6) Maintenance and Support

The first year of the Project will be regarded as the trial period for a prototype system. At the time of introduction, introductory training for developers will be organized, and system introduction manuals and user manuals will be prepared. The duration of maintenance and support period will be discussed with the GFD. When a problem with the system occur during the maintenance and support period, the system will be fixed immediately. At the end of the period, based on the outcomes from the initial training and results of the system operation, future improvement plans will be organized.

(3) Prioritization of Target Mangrove Plantation Areas

In Gujarat, mangrove plantations exist widely in coastal areas of the state, and plantation sites are often selected based on local knowledge and expertise developed from the past research projects. One foreign species is widely planted because of its tolerance to high salinity and turbulence as well as its growth speed. To select suitable plantation sites and appropriate species for the selected sites, satellite RS will be used. The use of satellite RS will make it possible to identify the location and extent of mudflats and intertidal zones and examine appropriate tree species and planting methods in the selected areas. Moreover, using location data such as creeks and shorelines along with RS analysis results in GIS, the selected areas will be subdivided into zones for the prioritization of plantations. Table 6.3 illustrates the workflow of this RS/GIS-based mangrove plantation site selection.

Table 6.3: Workflow of RS/GIS-based Mangrove Plantation Site Selection

No.	Criteria (Tentative)	Data/Method used
1	Select target forest divisions (refer to the main study team report.)	N/a
2	Extract coastal zones from satellite imagery observed at low tide by automatic classification	Satellite imagery
3	Separate intertidal zones (IZ) from mudflats (MF) by visual interpretation	Satellite imagery
4	Prioritize MF and IZ by proximity to shoreline and creeks respectively (e.g. X m from edge of creeks or shoreline. The closer, the higher priority.)	Creek data, Shoreline data
5	For MF, check the mud conditions (soft mudflat (SF) or hard mudflat (HM))	Physical Verification
6	Select planting method and species	Consultation

Source: JICA Study Team (2019)

To achieve this workflow, RS and GIS analysis are required. The following shows expected specific tasks through the workflow.

1) Preparation of Satellite Imagery

Satellite imagery for the target areas will be selected for the site selection. In the context of Gujarat, it is said that February and March are often preferred because of favorable cloud conditions. At the

same time, to interpret coastal zones, including mudflats and intertidal zones, satellite imagery observed at low tide needs to be selected. The selected satellite imagery will be appropriately processed prior to the following classification.

2) Automatic Classification

Using the selected satellite imagery, classification analysis will be conducted. In object-based classification, neighboring pixels of satellite imagery are grouped to create segments, which are used as a minimum classification unit. As a result, coastal zones will be automatically extracted from the neighboring different land cover areas.

3) Manual Interpretation

It is assumed that coastal zones can be relatively easily extracted from satellite imagery. On the other hand, it is difficult to automatically separate intertidal zones from mudflats. For this, visual interpretation of satellite imagery will be conducted to separate between mudflats and intertidal zones. In addition to the base satellite imagery, very-high-resolution satellite imagery available in Google Earth will be also used to check the classification results.

4) Buffer Analysis

Buffers with determined distance from creeks will be created. Selected polygons of mudflats will be overlaid with the creek buffers in GIS, and polygons within the buffers will be selected for the prioritization of plantation sites. In the same manner, buffers with determined distance from shorelines will be created. Selected polygons of intertidal zones will be overlaid with the shoreline buffers in GIS, and polygons within the buffers will be selected for the prioritization of plantation sites. Thresholds in distance from creeks and shorelines will be further examined.

One key consideration is that mangrove forests do not grow on dry land, and it is not suitable to develop mangrove plantations on those lands. For this reason, lands without floods should be excluded. If applicable, this criterion will be additionally set based on time series of satellite imagery.

5) Physical Verification

With the classification maps, physical verification that is led by experts in coastal forests and mangroves will be conducted. At the selected sites, soil type and conditions will be examined, and tree species and plantation methods will be determined. For the selection and prioritization of mangrove plantation sites, the GEER Foundation has experience with mangrove management. Consultation and information exchange with the GEER Foundation will play a key role in the development of an appropriate selection and monitoring system.

(4) Drone-Based Plantation Monitoring

Monitoring is required for plantations. Before engaging in activities, working plans (or management plans or microplans) are prepared, and the target sites are surveyed to examine ground conditions. In this regard, drones will be used to capture the entire target site, instead of using existing satellite imagery or a GPS survey map. Figure 6.6 illustrates the entire workflow of plantations and possible use cases of drones within the workflow.

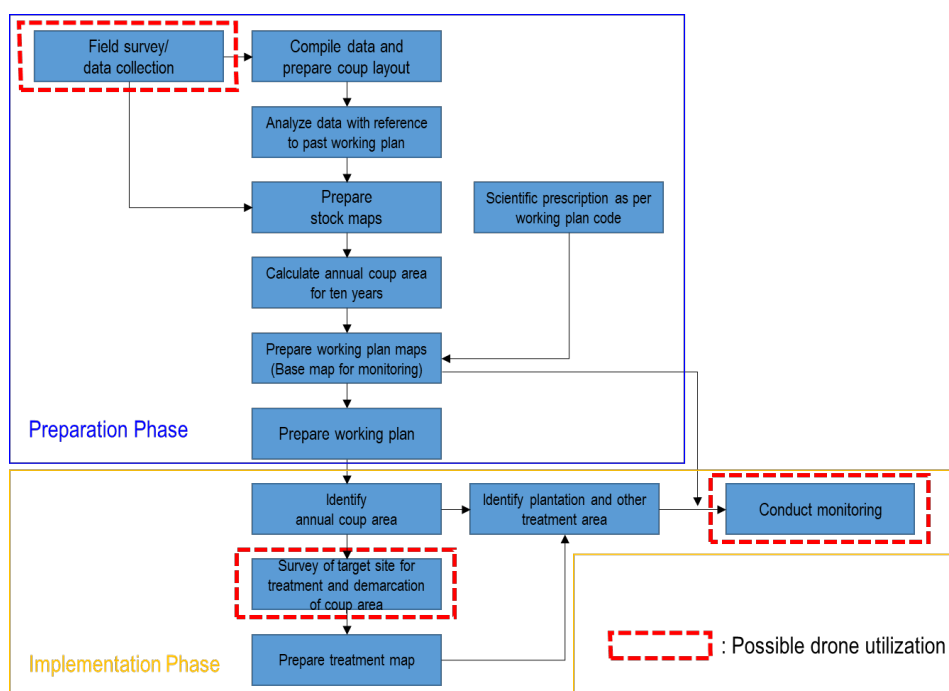


Figure 6.5: Basic Workflow for Plantation Monitoring

In addition to the utilization of drones for preparation, drones will be also used for conducting monitoring. For instance, aerial photos taken by drones will be used as reference for cross-checking physical verification data. Moreover, while random sampling monitoring with physical verification and the TPM will be conducted as it is presently conducted, very-high-resolution aerial photos taken using drones will be used for monitoring the rest of sites at a later stage. Table 6.4 shows examples of present and future monitoring methods.

Table 6.4: Future Drone-based Monitoring

No.	Present		Future	
	Method	Description	Method	Description
1	Physical Verification Monitoring	All individual trees are checked by physical verification.	Physical Verification Monitoring	All individual trees are checked by physical verification.
2	Random Sampling Monitoring	Some individual trees are checked by physical verification, and the rest are unchecked.	Random Sampling Monitoring + Drone-Based Monitoring	Some individual trees are checked by physical verification, and the rest are checked by drones.
3	Third Party Monitoring (TPM)	Some individual trees are checked by physical verification, and the rest are unchecked.	Third Party Monitoring + Drone-Based Monitoring	Some individual trees are checked by physical verification, and the rest are checked by drones.

Source: JICA Study Team (2019)

To implement drone-based surveys and monitoring, three implementation structures will become available. Table 6.5 shows the three possible implementation structures for drone-based surveys and monitoring and the division of roles. In the context of the Project, considering the current capacity of GFD as well as required high technical knowledge and skills, the first or second options appear appropriate.

Table 6.5: Possible Implementation Structure for Drone-Based Surveys and Monitoring

No.	Equipment	Operation	Maintenance
1	Outsourcing company	Outsourcing company	Outsourcing company
2	GFD/PMU	Outsourcing company (Leasing equipment)	Outsourcing company (Leasing equipment)
3	GFD/PMU	GFD/PMU	GFD/PMU

Source: JICA Study Team (2019)

In case of the first option, it is not required for GFD/PMU to register drones and obtain flight permits from relevant agencies because all procedures will be done by outsourcing companies. On the other hand, the second or third options will require GFD/PMU to go through all procedures on its own.

1) Outsourcing Company Selection

Drone operation will be outsourced to a private company. The Project will require the outsourcing company to support the GFD in the following ways:

- Provide regional operation centers/hubs within the state to minimize travelling time and cost.
- Support the GFD completing registration procedures before the start of drone-based monitoring.
- Maintain drones and relevant equipment properly during the lease period.

2) Registration

The general steps required for drone registration are shown below. For government use, the requirements may be different from those discussed above. The PMU and the PMC will further examine actual requirements in advance.

- Step 1: Register operators
- Step 2: Check for an Original Equipment Manufacturer (OEM) certificate from the manufacturer and National Physical Laboratory (NPL) letter
- Step 3: Register drones through the web platform called “Digital Sky”
- Step 4: Obtain Unique Identification Numbers (UIN) from Digital Sky
- Step 5: Attach the UIN to the Unmanned Aircraft or drone to be registered
- Step 6: Apply for Unmanned Aircraft Operator Permit (UAOP) License through Digital Sky
- Step 7: Receive appropriate training
- Step 8: Install No Permission, No Take-off (NPNT) application on drones to be registered

Of all the required steps, (1) operator registration (Step 1), (2) drone registration (Step 3 and 4), (3) flight permit (Step 6), and (4) training (Step 7) are described in detail below.

a. Register Operators

Before the registration of drones, the operator and pilot need to be registered. The Director General of Civil Aviation (DGCA) in the Government of India issued the guideline “Civil Aviation Requirements” (“CAR”) vide F. No. 05-13/2014-AED Vol. IV on August 27, 2018 and became effective in December 1, 2018 for Remotely Piloted Aerial Systems (RPAS) or drones and also launched the online portal called “Digital Sky” for registration of drones, pilots, operators and manufacturers. As per the guidelines, the drones, Unmanned Aerial Vehicles (UAVs), or Remotely Piloted Aircrafts (RPAs) are categorised into five types based on the weight of aircraft (Table 6.6).

Table 6.6: Types of Drones and Weight of the Aircraft

No.	Category	Weight
1	Nano	Less than or equal to 250 grams
2	Micro	Greater than 250 grams and equal to 2 kg
3	Small	Greater than 2 kg and equal to 25 kg
4	Medium	Greater than 25 kg to 150 kg
5	Large	Greater than 150 kg

Source: DGCA Guideline “Civil Aviation Requirements”

For flying and operating Nano category drones, neither registration nor permission is required. For those in Micro or above categories, on the other hand, drone operators are required to register via the Digital Sky portal.

b. Register Drones

After registration of user with Digital Sky, the user needs to register drones. To register drones, a UIN for Drones needs to be obtained with the submission of the following documents:

- Equipment Type Approval from the Wireless Planning and Coordination (WPC) Wing
- OEM Certificate
- Security documents from the Ministry of Home Affairs (MHA) or copies of any two IDs (Passport, Driving License, Aadhaar ID number)
- Specification of Unmanned Aircraft System (UAS) and applicable manuals.
- Any other supporting documents deemed necessary

Source: DGCA RPAS Guidance Manual

The user needs to fill the form with valid credentials and make the payment for obtaining UIN. The user also needs to inscribe fire resistant identification plate with UIN affixed to drones. In case the drones are damaged, DGCA should be informed for cancellation of UIN, and the change of operator or contact details specified in UIN should be immediately notified to DGCA and all other concerned agencies. Fees required for UINs are shown below (Table 6.7):

Table 6.7: Fees Required for UIN

No.	Item	Amount (in INR)
1	UIN	1,000

Source: DGCA RPAS Guidance Manual

c. Receive Training

Drone operators will get appropriate training to understand the core requirements of drone operations as well as to improve operation skills.

d. Acquire Flight Permit

After drones and the operators are ready, an Unmanned Aircraft Operator Permit (UAOP) is obtained through the Digital Sky portal by seven days before actual commencement of drone operations/flights. For this, documents similar to what is required for the UIN are submitted. Fees required for UAOPs are shown below (Table 6.8):

Table 6.8: Fees Required for UAOP

No.	Item	Amount (in INR)
1	UAOP License	25,000
2	Renewal of UAOP License	10,000

Source: DGCA RPAS Guidance Manual

3) Drone-Based Monitoring

After all of the preparation work is completed, drone-based surveys will be implemented periodically to understand spatial changes over the Project period. Data or images collected by a sensor mounted on drones will be orthorectified and superimposed on the base dataset for change/progress monitoring. The monitoring team will be composed of the drone expert (the leader), the division-level GIS operator, and range-level officers. The drone expert and division-level GIS operator will prepare monitoring reports after each visit for future reference. Drone-based surveys will be conducted at first in the preparation phase of monitoring; after the monitoring has started, drone-based surveys will be conducted every November over the Project period. For the mangrove plantation, to fix the baseline for future monitoring and evaluation, an initial survey will be carried out, especially between August and September. After the initial survey, the target mangrove plantation sites will be periodically surveyed every six months. Besides this, drones will be used for monitoring such objects/activities as wildlife animals and their habitat, forest fires, illicit felling, and encroachment as needed on a trial basis. Table 6.9 illustrates a tentative drone-based monitoring schedule for three types of plantations (tree plantation, grass plantation, and mangrove plantation) as well as on-demand monitoring activities throughout the entire Project period.

Table 6.9: Tentative Drone-Based Monitoring Schedule for Plantations

Work Items	1st Year				2nd Year				3rd Year				4th Year				5th Year				6th Year				7th Year											
	10	20	30	40	10	20	30	40	10	20	30	40	10	20	30	40	10	20	30	40	10	20	30	40	10	20	30	40								
Registration	Preparation				Implementation																												Consolidation			
Initial Survey (Tree Plantation)					■	■	■	■																												
Initial Survey (Grass Plantation)					■	■	■	■																												
Initial Survey (Mangrove Plantation)																																				
Monitoring (Tree Plantation)													■								■								■							
Monitoring (Grass Plantation)																																				
Monitoring (Mangrove Plantation)																																				
Monitoring (Wildlife and Others)																																				
SOP																																				

Source: JICA Study Team (2019)

For other activities, such as the monitoring of illegal activities and patrolling, drones will be operated on demand. In addition to drone-based surveys, satellite RS will be also utilized. Satellite imagery with high spatial resolution will be supplementary to classifying target land cover and land use types, as well as temporal changes. Because it is not always easy for surveyors to cover wide target sites using only drones, this will help surveyors narrow down the target areas for drone-based surveys.

To complete the above Project activities, drone-based surveys will be implemented in different places across the state, and this will require a lot of travel. To minimize travelling time and cost and increase the efficiency of operation and maintenance, it is important to select an appropriate implementation structure. Table 6.10 summarizes the pros and cons of establishing regional hubs for drone operation and maintenance. This implies that outsourcing companies that can set up regional operation centers will be preferred.

Table 6.10: Characteristics of Establishment of Regional Hubs for Drone-Based Surveys

		With Regional Hubs	Without Regional Hubs
Operation	Pros	<ul style="list-style-type: none"> Traveling time is minimal, and surveys can be started quickly. Localized operations can be conducted at demand. Cooperation with other monitoring systems (e.g, the high tech monitoring unit in 	<ul style="list-style-type: none"> Data management can be centralized. Qualified drone operators can work at the headquarters.

		With Regional Hubs	Without Regional Hubs
		<ul style="list-style-type: none"> Sasan Gir) can be established. Opportunity to operate drones (including test flights) may increase. 	
	Cons	<ul style="list-style-type: none"> Qualified drone operators need to stay in each region separately. (Private vendors cannot be stationed in a remote office for long time.) Command structure becomes complicated. 	<ul style="list-style-type: none"> Traveling time can be long, and surveys are started late.
Maintenance	Pros	<ul style="list-style-type: none"> The amount of maintenance work can be shared. 	<ul style="list-style-type: none"> New office space is not required. Drones can be repaired easily because of closeness to vendors.
	Cons	<ul style="list-style-type: none"> New office space is required, and related costs increase. The number of unused drones may increase depending on the work load. 	<ul style="list-style-type: none"> All maintenance work needs to be conducted at the headquarters.

Source: JICA Study Team (2019)

4) Standard Operating Procedures (SOP)

The collected data and information will be organized in the form of a Standard Operation Procedure (SOP). The SOP will be used as a manual for Project interventions to provide systematic training for different officers. The SOP will be also developed to monitor the progress of Project activities and understand the outcomes from the Project. The SOP will include not only observations and information of target sites, but also photos taken on site at least at the beginning and end of the Project. The template will be discussed between key stakeholders in advance in order to maintain the usability of the SOP.

6.1.2. GIS/MIS Enhancement

(1) Equipment Procurement

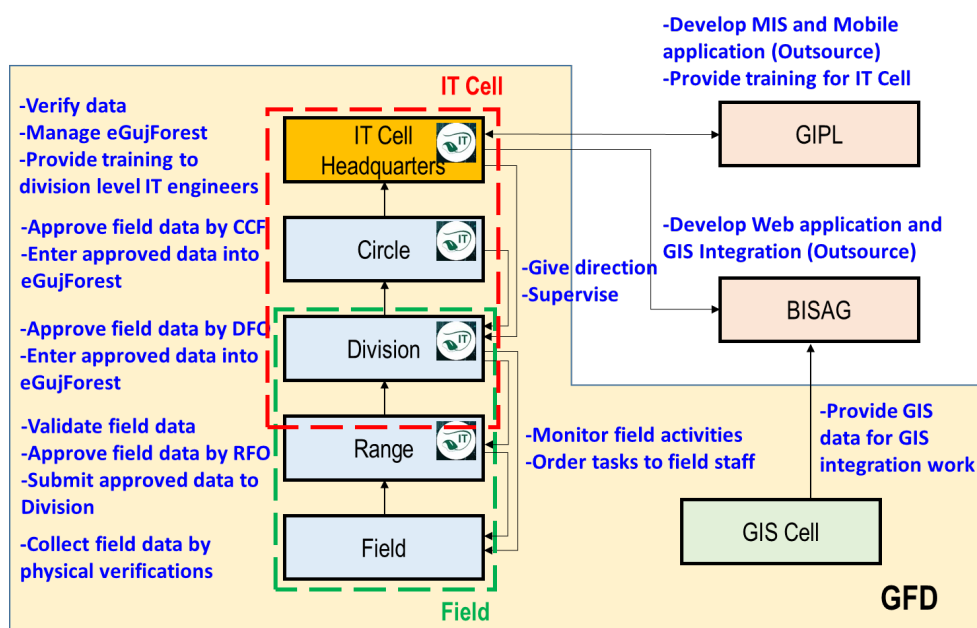
Although GIS and MIS play a key role in the proposed Project activities and their objectives such as spatial visualization, documentation of progress, and long-term impact assessment, the internal GIS capacity of the GFD is limited, and it is not feasible to smoothly implement the activities and also achieve the objectives under the current infrastructure conditions. To increase its GIS capacity, the GIS Unit will be set up with some additional hardware and software for the smooth implementation of Project activities. For instance, drones will be purchased for plantation monitoring and leased to outsourcing companies. Tablets will be distributed to field staff members at range levels or below. High-spec workstations will be used by GIS/RS operators to process the large volume of data. Other equipment such as Differential GPS (DGPS), GPS, plotters, scanners, MFP, and ADF will be also the part of equipment proposed for the GIS Unit. In the context of the Project, because of the current policy made by the PCCF, it is possible that cost-free GIS and RS software and satellite imagery will be also procured as necessary.

In order not to delay the commencement of Project activities, it is important to examine the time required from the order of equipment to its delivery and start the procurement at the initial stage of the preparatory phase. The GFD used to inform Gujarat Informatics Ltd. (GIL), the nodal agency for IT development in the state established by the Government of Gujarat, of the quantity of equipment, and then GIL used to prepare specifications for bidding. In the Project, however, the set of equipment will be also procured from the Government e-Marketplace (GeM). GeM is the National Public Procurement Portal and an end-to-end online marketplace for the central and state government ministries/departments, Central and State Public Sector Undertakings (CPSUs and SPSUs),

autonomous institutions, and local bodies, for the procurement of common use goods and services. The portal is run by the GeM Special Purpose Vehicle (SPV), which is a Section 8 (Non-Profit) Company registered under the Companies Act, 2013. The GeM SPV operates, monitors, and supervises all of the business transactions on the portal through the managed service provider, as per roles and responsibilities defined in the legal framework document available on the GeM portal. The Government of Gujarat signed a Memorandum of Understanding (MoU) with GeM on 11 July, 2017⁴³ for the use of GeM facilities by state government offices.

(2) Expansion of eGujForest Operation

As of October 2019, eGujForest operation by the IT Cell is conducted between the divisions, circles, and headquarters, while field data collection is conducted between ranges and divisions. At the same time, GIPL and BISAG are involved in the development work for eGujForest. The current relations between these agencies, as well as their roles and responsibilities, are summarized in Figure 6.8.

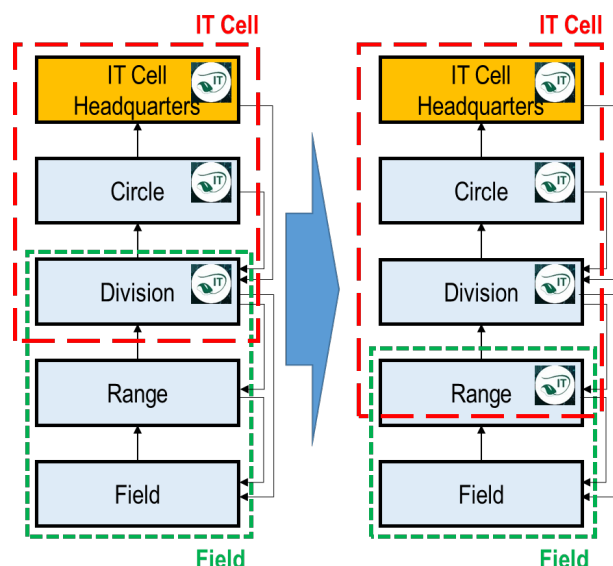


Source: JICA Study Team (2019)

Figure 6.6: Current Operation Flow and Roles and Responsibilities for eGujForest

In the Project, the operation flow will be modified. While divisions are a data entry point for eGujForest at present, ranges will become a data entry point as long as GSWAN connectivity is available (Figure 6.9). As a result of this shift, paper-based data flow from ranges to divisions will be reduced, and the efficiency of the entire system will be improved. At the same time, together with the infrastructure under improvement as discussed in Section 2.4, this shift further supports the expansion of GIS operation down to division offices and tablet-based monitoring by range and field officers.

⁴³ <https://gem.gov.in>



Source: JICA Study Team (2019)

Figure 6.7: Before (Left) and After Shift (Right) of eGujForest Operation Flow

(3) Development of New GIS and Mobile Applications

As discussed in Chapter 2, a total of 21 modules have already been developed in eGujForest, and new modules are also currently under development on demand. Annexure 2.1 describes existing modules and sub-modules in eGujForest, as well as their purposes, in detail. In the Project, new GIS modules for eGujForest and eVan, an ICT tool, will be developed.

1) New GIS Modules for eGujForest

From the point of view of GIS, considering the requirements for Project activities, the following modules will be added to the existing system (Table 6.11). For this, it is required to thoroughly review the existing system and ensure compatibilities between the existing system and new modules.

Table 6.11: Indicative List of Proposed New GIS Modules for eGujForest

No.	Module Name	Descriptions
1	GPS data processing	<ul style="list-style-type: none"> A module for the downloading of GPS data and post processing for the standardization of data can be added to application. These data can be used for preparing such maps as plantation area maps, Project area maps, and maps for location of interventions.
2	Image repository	<ul style="list-style-type: none"> In place of open image repository, an ortho-rectified satellite image repository can be added to application with a function to superimpose the GPS data and in-built time series data for uniformity in maps at field level and time series analysis. Repository of NDVI images and change analysis images for user-defined analysis for specific area/project site can be added.
3	Map composition	<ul style="list-style-type: none"> A module for map composition can be added to the application for high quality maps, with labels, legends, scale, index map, grids, and texts.
4	Visualaization of cloud-analyzed data	<ul style="list-style-type: none"> A module for preprocessing and loading cloud-based analysis data to eGujForest

Source: JICA Study Team (2019)

2) Development of Mobile Applications

In the Project, eVan, a type of ICT tool, will be developed based on the existing mobile applications. eVan is an application for Android-based mobile phones and intends to connect local people and GFD officers in a timely manner. This will also connect local rescue and wildlife experts with local people and GFD officers to address emergency situations together by exchanging and sharing information and eventually improve the overall forest management. Table 6.12 shows indicative eVan features. Considering existing features of the current mobile applications, these features will be further discussed with the GFD after the start of the Project.

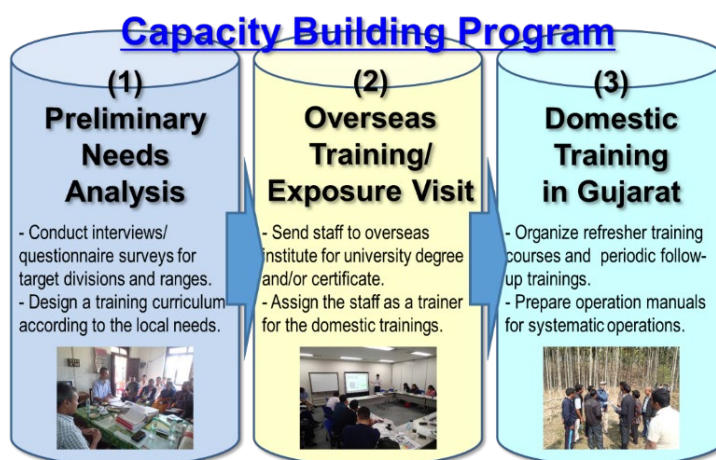
Table 6.12: Indicative List of eVan Features

No.	Indicative Features
1	One time registration (free of cost)
2	Access to educational material
3	Attendance facility
4	Voice call facility
5	Message facility
6	Location capturing
7	Emergency call service
8	Rescue service connection
9	Toll free service

Source: DPR

6.1.3. Capacity Development

To efficiently improve the capacity of the GFD, consistent and comprehensive training programs need to be organized. In this regard, three major steps are described below (Figure 6.10). To begin, in order to understand real needs at different sites, needs analyses will be conducted. Workshops will be also organized to explain the overall picture of the Project. Second, selected officers will be sent to overseas educational institutions to become trainers for other government staff members. Third, a systematic training program will be developed, and a series of training courses, led by the trainers just mentioned, will be provided to staff at the headquarters and local offices. The capacity development in the Project will primarily intend to improve not so much the GFD officers' specific operational skills for GIS analysis as their overall technical literacy and understanding about GIS. As a result of the capacity development activities, trained GFD officers will become able to validate deliverables from the Project, as well as establish a good technical communication with outsourcing companies and the PMC.



Source: JICA Study Team (2019)

Figure 6.8: Image of Step-wise Training Program

(1) Preliminary Needs Analysis

Although field staff members have received training for new devices, some of them found it difficult to use in their daily work and still tend to depend on conventional devices. For this, questionnaire surveys that target all ranges will be conducted to understand the current actual on-the-ground needs. The surveys will contain questions about the size of patrolling areas, distance, and frequency. This will make it possible to identify various local issues in different regions and persons, and appropriate training will be provided accordingly. Moreover, workshops will be organized in each division to share the overall picture of the Project.

(2) Overseas Training/Exposure Visits

Prior to the domestic comprehensive and consistent training courses, overseas training or exposure visits will be organized. The purpose of having such an opportunity for the GFD is to give exposure to the latest technological and management interventions in GIS and MIS. During the implementation phase of the Project considering the preliminary needs analysis results, the PMC will determine the requirements and plan and organize the training/exposure visit accordingly. Participants in overseas training/exposure visits (e.g. young range officers with a good IT literacy) are expected to learn new technologies and practices, share their learning with the rest of the Project personnel and stakeholders upon their return as trainers, and put these into practice. Therefore, the participants should be selected from those who have been working for the Project on a full-time basis and have the willingness and commitment to remain at the position during the rest of the Project as trainers for the following domestic trainings in Gujarat.

1) University Degree in Overseas Countries

Tamil Nadu Forest Department (TNFD) can be a good model for overseas training for the Project. TNFD sent officers to the International Institute for Aerospace Survey & Earth Observation (ITC)⁴⁴ in the Netherlands for advanced technical training, and to national institutes such as NRSC, the Indian Institute of Remote Sensing (IIRS), and the Forest Survey of India (FSI). After the completion of training, they became master trainers and further trained the staff at the headquarters and field offices of the TNFD. The GFD will also consider sending staff to overseas institutions to enhance the internal capacity of the GFD enough to discuss technical matters with outsourcing agencies and understand international trends in the GIS and RS fields. This overseas training intends to include deputed two range or division-level officers with a good level of IT literacy.

2) Training at School Specialized for Drone Operation and Data Post-Processing

Drone market in India is still developing, and it seems difficult to find schools that provide courses for not only drone operation but also data post-processing. Under these circumstances, participants will go overseas countries where relevant drone schools that provide courses of drone operation, safety management, and data post-processing exist. In Japan, for example, there are some drone schools that meet these project requirements. An indicative list of relevant drone schools in Japan is shown in Annexure 6.2.

(3) Domestic Training in Gujarat

Based on the preliminary needs analysis results, appropriate training will be organized. The training courses will intend to improve the GFD's literacy in assessing GIS and RS data and ability to communicate with relevant agencies. The training also aims to improve consistency between the headquarters and field offices by involving not only technical officers but also non-technical officers who actually use the system. At the same time, rangers and foresters will also be involved in the basic GIS training courses. This will make it possible to standardize operating procedures and develop a common understanding within the GFD. Table 6.13 and Table 6.14 show possible training courses

⁴⁴ <https://www.itc.nl/>

for GIS/RS and MIS, respectively.

Table 6.13: Indicative List of GIS and RS Training Courses

No.	Title	Contents	Type	Duration	Expected Participants
1	Basic GIS/RS	Basic GIS and RS analysis	Lectures and Exercises	5 days	2 GIS/RS Technicians at Headquarters 11 IT Engineers at Circle Offices 27 IT Engineers at Division Offices
2	Advanced GIS/RS	Imagery processing and analysis	Lectures and Exercises	5 days	2 GIS/RS Technicians at Headquarters
3	Field Survey (1)	Field data collection, photo capture using mobile tablet	Lectures and Exercises	5 days	2 GIS/RS Technicians at Headquarters 11 IT Engineers at Circle Offices 27 IT Engineers at Division Offices 114 IT Engineers at Range Offices
4	Database	Database, cloud server	Lectures and Exercises	5 days	2 GIS/RS Technicians at Headquarters
5	Field Survey (2)	Field data collection using drones	Lectures and Exercises	5 days	2 GIS/RS Technicians at Headquarters 11 IT Engineers at Circle Offices 27 IT Engineers at Division Offices 114 IT Engineers at Range Offices
6	Web GIS	Operation and maintenance of Web GIS	Lectures and Exercises	5 days	2 GIS/RS Technicians at Headquarters
7	Cloud RS Data Analysis	Remote sensing analysis using Google Earth Engine	Lectures and Exercises	5 days	2 GIS/RS Technicians at Headquarters

Source: JICA Study Team (2019)

Table 6.14: Indicative List of MIS Training Courses

No.	Title	Contents	Type	Duration	Expected Participants
1	Basic MS Office & Internet (Introductory)	Software Word/Excel and Internet operation	Lectures (2 days) and Exercises (3 days)	2 days	2 GIS/RS Technicians at Headquarters
2	MIS (Introductory)	MIS application for data collection, entry and reporting	Lectures (2 days) and Exercises (3 days)	2 days	2 GIS/RS Technicians at Headquarters
3	MIS (Follow-up)	Module wise data verification and reporting	Exercises	2 days	2 GIS/RS Technicians at Headquarters
4	MIS (Follow-up 2)	Security and back up procedure for MIS data	Lectures (1 day) and Exercises (1 day)	2 days	2 GIS/RS Technicians at Headquarters

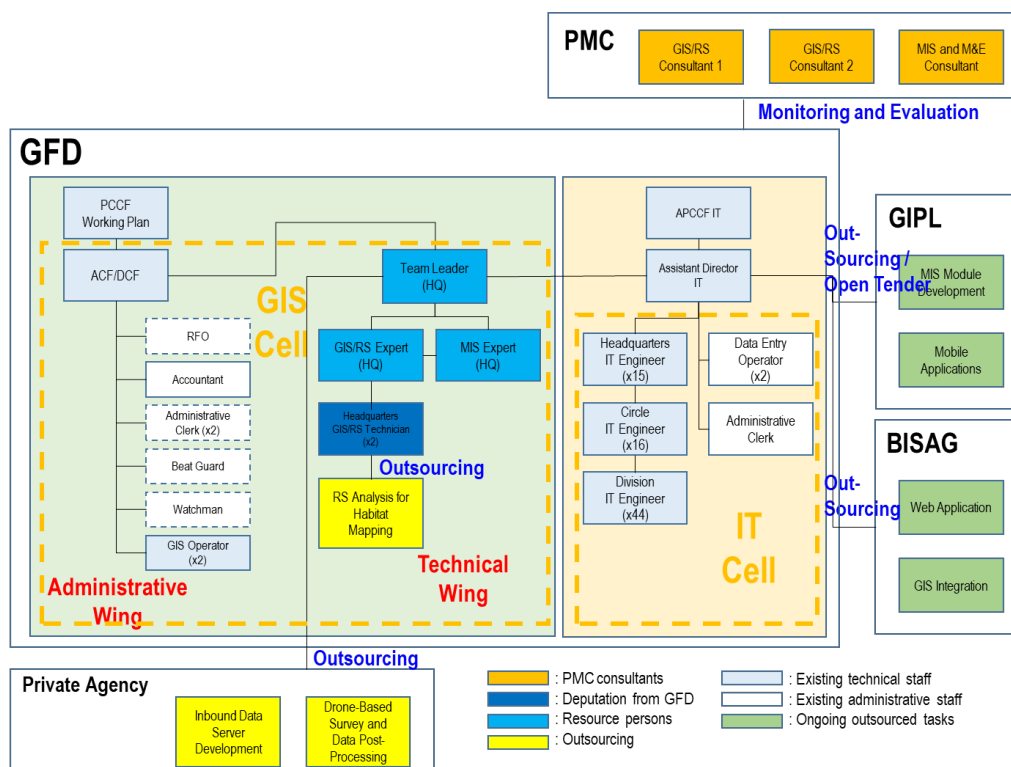
Source: JICA Study Team (2019)

For each training course, operation manuals will be prepared for future systematic operations and

shared within the GFD.

6.1.4. Institutional Arrangement

To implement Project activities, various officers with different expertise will be needed and will have different roles and responsibilities. Securing an appropriate institutional structure is essential for the smooth implementation of the Project. Figure 6.11 illustrates the proposed institutional arrangement for GIS and MIS.



Source: JICA Study Team (2019)

Figure 6.9: Institutional Arrangement for GIS and MIS

Overall, in this arrangement, a technical wing will be established under the ACF/DCF while shifting the existing GIS Cell towards an administrative wing. Hired experts and operators will communicate with the ACF of the GIS Cell and the Assistant Director of the IT Cell for progress monitoring and problem solving. The map making work will be outsourced to a private specialized agency, and the required operation will be carried out by a team of GIS/RS operators at the GIS Cell. This work will be carried out in close collaboration with the GFD and wildlife experts as their significant inputs are required and may flow regularly from GFD staff and records. Inbound server development and drone-based monitoring that involves surveys and data post-processing will be also outsourced to private specialized agencies. Lastly, the PMC has multiple experts who monitor Project activities and give advice as needed. For the RS and GIS fields, international experts are placed in order to efficiently introduce the proposed Japanese domestic technology to the GFD during the Project. Annexures 6.3 and 6.4 show the qualifications of PMC consultants and the roles and responsibilities of individual members of PMU, respectively. At the same time, Annexures 6.5, 6.6, and 6.7 show indicative TORs for outsourcing map making, inbound server development, and drone-based surveys and data post-processing, respectively.

Further, expected PMU staff members for GIS and MIS and their expected qualifications are shown in Table 6.15.

Table 6.15: Expected PMU Staff for GIS and MIS and their Expected Qualifications

No.	Title	Number	Selected From	Rank/Level	Remarks
1	Team Leader	1	Hired from the market		
2	GIS/RS Expert	1	Hired from the market		
3	MIS Expert	1	Hired from the market		
4	GIS Technician at HQ level	2	Deputed from GFD	ACF/RFO-rank or higher	With a good basic IT literacy
5	GIS Operator at HQ level (Temporary)	15	Hired from outsourcing agency	Degree of B. Tech or Higher Work experience with more than five years in RS and GIS fields	

Source: JICA Study Team (2019)

6.1.5. Implementation Plan

The proposed Project activities related to GIS and MIS will be implemented according to a implementation plan prepared in advance (Table 6.16).

Table 6.16: Indicative Implementation Plan for GIS and MIS

ID	Activities	1st Year				2nd Year				3rd Year				4th Year				5th Year				6th Year				7th Year			
		1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
		Preparation				Implementation												Consolidation											
6.1.1	Introduction of Geospatial Technology																												
6.1.1 (1)	Habitat Mapping																												
6.1.1 (2)	Cloud-Based Data Management and Monitoring																												
6.1.1 (3)	Prioritization of Target Mangrove Plantation Areas																												
6.1.1 (4)	Drone-Based Plantation Monitoring																												
6.1.2	GIS/MIS Enhancement																												
6.1.2 (1)	Equipment Procurement																												
6.1.2 (2)	Expansion of eGujForest Operation																												
6.1.2 (3)	Development of New GIS Modules for eGujForest																												
6.1.3	Capacity Development																												
6.1.3 (1)	Preliminary Needs Analysis																												
6.1.3 (2)	Overseas Training/Exposure Visits																												
6.1.3 (3)	Domestic Training in Gujarat																												

Source: JICA Study Team (2019)

The detailed implementation plan for GIS and MIS is shown in Annexure 6.8.

6.1.6. Cost Estimate

<i>Close to the public</i>

6.1.7. Operation and Effect Indicator

The effects of the Project will be examined using the following operation and effect (O&E) indicators (Table 6.17)

Table 6.17: O&E Indicators and their Monitoring Methods for GIS and Drones

Indicator	Baseline	Target	Target Year	Monitoring Method	Responsibility
Use of GIS	2020 (To be confirmed)	More than X % of offices of concerned institutions uses GIS related techniques for planning and monitoring.	2027 (At project completion)	<ul style="list-style-type: none"> Extent of use and degree of understanding will be checked through interview and questionnaire survey at the beginning of the Project and before the completion of the Project. 10 GIS data sets generated will be counted each year. 	GFD
Use of Drones	2020 (To be confirmed)	More than 1 % of surveys use drones.	2027 (At project completion)	<ul style="list-style-type: none"> The number of completed drone-based surveys is counted at the end of project period. 	GFD

Source: JICA Study Team (2019)

6.1.8. Operation and Maintenance Structure

The assets created during Project implementation will be managed mostly by the Project. After the Project is completed, the responsibility of operation and maintenance (O&M) will be transferred to the GFD (Table 6.18).

Table 6.18: O&M Structure for GIS and MIS

Infrastructure/ Institutions Created under the Project	O&M Institution	Maintenance Mechanism
GIS/MIS	GFD	<ul style="list-style-type: none"> GIS/MIS will be utilized in PMU during the Project implementation period Systems and equipment will be transferred fully to the GFD before the Project completion
Drones	GFD	<p><Before mid-term review></p> <ul style="list-style-type: none"> Systems and equipment, except those that originally belong to outsourcing companies, will be transferred fully to the GFD before Project completion <p><After mid-term review></p> <ul style="list-style-type: none"> Drones will be leased to outsourcing companies during the Project implementation period Systems and equipment, except those that originally belong to outsourcing companies, will be transferred fully to the GFD before Project completion

Source: JICA Study Team (2019)

6.2. Scope of Work for CSR/Private Partnership for Afforestation

6.2.1. Contextualizing CSR/Private Partnership in the Project

(1) Status of CSR in the Project Districts⁴⁵

In the Project area, 115 companies spent 1,023.3 million INR for CSR activities in nine districts during FY 2017-18. Most of the companies are located in Bharuch, Surat, Vadodara, and Valsad. The highest spending was seen in Bharuch, followed by Valsad. For other Project districts, no CSR expenditure was reported during the financial year.

Table 6.19: CSR Spending of the Companies in the Project Districts

Sl. No.	Project Area	Districts	No of Companies	CSR Spending in million INR
1	x	Amreli	2	82.4
2	x	Anand	8	14.0
3	x	Banas Kantha	2	4.8
4	x	Bharuch	11	58.0
5	x	Bhavnagar	9	26.3
6	x	Chhotaudepur	1	136.4
7		Dang	2	3.2
8	x	Devbhumi Dwarka	0	0.0
9	x	Gandhinagar	5	96.1
10		Jamnagar	4	13.1
11	x	Junagadh	2	1.6
12	x	Kachchh	1	1.5
13	x	Kheda	1	1.2
14	x	Mahesana	3	3.4
15	x	Morbi	1	0.2
16	x	Navsari	1	3.4
17		Rajkot	9	32.1
18	x	Surat	13	168.7
19		Surendranagar	3	8.7
20	x	Vadodara	36	356.5
21	x	Valsad	19	68.8
22		Not mentioned		6,612.5

Source: National CSR Portal, CSR Cell, Ministry of Corporate Affairs (<https://www.csr.gov.in/index18.php>) accessed on 13 October 2019.

Out of the total CSR projects in the Project area, health, hunger, poverty, malnutrition and the water and sanitation sector received the highest amount of CSR funds, accounting for 38.7% of the total CSR funds spent in FY 2017-18. Spending related to education, the differently abled and livelihood reached 33.4%. The environment, animal welfare, and conservation of resources received 6.5% of CSR funds.

⁴⁵ The data in this section is derived from the National CSR Portal. (<https://www.csr.gov.in/>)

Table 6.20: District Wise Distribution of CSR Projects in Main Sectors (FY 2017-18)

Unit: Million INR (Unless Otherwise Noted)

Districts	CSR Spending	Education, Differently Abled, Livelihood	Health Eradicating Hunger, Poverty and Malnutrition, Safe Drinking Water, Sanitation	Rural Development	Environment, Animal Welfare, Conservation of Resources	Heritage Art and Culture
Amreli	82.4	29.0	3.0	36.2		
Anand	14.0	6.9	0.1	6.1		
Banas Kantha	4.8	3.0		1.8		
Bharuch	58.0	24.2	30.3	1.8	0.5	
Bhavnagar	26.3	10.0	4.9	9.1	0.1	
Chhotaudepur	136.4	25.8	109.6		0.1	0.9
Dang	3.2	1.6	1.6			
Devbhumi Dwarka	0.0					
Gandhinagar	96.1	47.3	12.4	14.3	2.8	15.0
Jamnagar	13.1	11.9	0.1		0.8	
Junagadh	1.6	0.9	0.5			
Kachchh	1.5	0.2	1.1		0.2	
Kheda	1.2		1.2			
Mahesana	3.4	0.5	0.8	1.7	0.4	
Morbi	0.2			0.2		
Navsari	3.4	3.4				
Rajkot	32.1	24.0	6.8	0.5	0.1	
Surat	168.7	103.4	52.9		2.8	2.0
Surendranagar	8.7	0.1	0.3		0.2	
Vadodara	356.5	80.0	258.9	5.4	1.9	2.8
Valsad	68.8	40.4	24.2	1.6	1.0	
NEC/ Not mentioned	6,612.5	2207.8	2557.1	352.8	429.5	812.5
% share in Total		33.4	38.7	5.3	6.5	12.3

Source: National CSR Portal, CSR Cell, Ministry of Corporate Affairs (<https://www.csr.gov.in/index18.php>) accessed on 13 October 2019.

Although limited information was available on partnership with NGOs, while implementing the CSR activities, Gujarat Tea Processors and Packers Limited (Sabarkantha) worked with SEWA Rural for livelihood projects, and UPL Limited worked with S. R. Shroff Aajivika Trust, BAIF and others. Companies like Ambuja Cement implemented activities through its own foundation. The companies that indicated direct implementation either donated funds or facilities/equipment (including the construction of buildings).

To sum up, the following issues concerning CSR were identified: 1) the corporates are struggling to identify the intervention areas; 2) not many organizations could provide specialized guidance in the activities concerning ecosystem management even if the company is interested; 3) CSR resources are concentrated on limited geographical and intervention areas.

(2) CSR/Private Partnership Projects in Forestry Sector

From the survey findings, the afforestation and mangrove plantation activities carried out by the companies can be divided into two categories. One is the projects carried as per the company's CSR policy. The other is the afforestation to compensate the environmental impacts induced by the

developmental activities of the company. The afforestation or mangrove regeneration activities undertaken under CSR can be implemented through NGOs that have signed a contract with the company or that have received donation. In all the reviewed cases, NGOs played an important role in implementation. There may also be a case in which the corporate's own foundation may implement the same. Types of afforestation and mangrove plantation projects under CSR/Private Partnership are outlined in the table below.

Table 6.21: Types of CSR/Private Partnership Projects, Mode of Implementation and Priorities

Type of Work	Mode of Implementation	Priorities for the Corporate Houses	Projects
CSR	Contract out to NGOs/CBOs	As per corporate CSR policy Survival rate matters	Mitsubishi Electronics India Pvt. (School Plantation) Shell (Mangrove)
	Donation to NGOs or to fund	The amount donated is important. Not so stringent monitoring requirement	Tokyo Marine Insurance Co., Ltd, Tokyo (Mangrove)
Compensatory Mangrove Plantation	Contract out to NGOs/CBOs	By law The number of trees planted matter	Adani

Source: JICA Study Team (2019) based on the Survey Findings

(3) Central Government Policy on CSR for Afforestation

Efforts to draw CSR resources for afforestation is not new. The previous version of the Forest Conservation Act Handbook contained guidelines for private sector participation, which was omitted in the latest version of the same handbook, issued in 2019. The Ministry of Environment, Forest and Climate Change (Forest Conservation Division) (vide F.No. 5-2/2017-FC dated August 26, 2019) has issued a notification to keep the same guidelines in the latest version. The guidelines provide opportunities for NGOs and corporates to take part in afforestation activities with technical guidance from the local Forest Department. The guideline stipulates the following eight points;

1. Agreement to be signed by NGO, local forest department and the company
2. Funds for executing the work to be provided by the company, technical guidance and supervision by NGO and local forest department.
3. Both NGO and company shall not claim the rights over the land and products of the project area
4. Protection of the rights of the communities on forest land
5. Each project duration including maintenance will shall be 5-7 years.
6. Rehabilitation and native species will be given priority.
7. The project area should be selected from the area having less than 40% of the forest density and artificial intervention is indispensable for regeneration.
8. The concerned forest department may include locally specific points to be considered for afforestation.

Source: Handbook of Forest (Conservation) Act 1980 and Forest Conservation Rules, 2003 (Guidelines & Clarifications), Ministry of Environment, Forest and Climate Change, Government of India. (2004).

(4) Examples of CSR/Private Partnership Afforestation & Mangrove Plantation

1) Greening of Maharashtra by Maharashtra State Forest Department

Maharashtra State Forest Department has a program called "Greening of Maharashtra" in which CSR resources are drawn for afforestation and NGOs were engaged in implementation. So far, the following achievement has been reported.

Table 6.22: CSR Projects Undertaken by Maharashtra State Forest Department

Name of the Industry	Plantation in Ha	Year of Project Approval
Tree Authority of Thane Municipal Corporation	50.00	2010
Bavkhaleshwer Trust	468.00	2012
Lwokim Motors	81.91	2012
Tree Authority of Vasai-Virar, Municipal Corporation	157.00	2013
M/s Machual & Risons Group (MARG)	55.00	2013
Tata Power Company Ltd	25.00	2013
Sahandri Co., Sugarcane Industries	40.00	2013
M/s Jindal Steel Ltd Dodali	26.00	2016
M/s Supriya Farma, Mumbai	15.00	2016
Total	917.91	

Source: Greening of Maharashtra, Maharashtra State Forest Department

2) Mangrove Plantation with Private Sector Financing by GEC

The GEC has been implementing the mangrove plantation with private sector funding. In most cases, the corporates approach GEC for facilitation, technical guidance and monitoring. The GEC identifies the suitable plantation sites and organize villagers into CBOs to take up the work. Technical training for the villagers, monitoring, and reporting to the corporates is taken care of by the GEC. Between 2006-7 and 2017-18, the GEC undertook 78 mangrove afforestation projects with private financing. Out of this total, 35 projects were implemented in Bharuch, followed by Surat (25 projects) and Kachchh (10 projects), with the average size of the plantation area being 97 ha per project. The year wise achievement is given in the table below.

Table 6.23: Year Wise Achievement of Mangrove Plantation by GEC with Private Sector Funding

FY	No of Projects	Total Plantation Area in Ha	Average Plantation Size per Project in Ha
2006	4	360	90
2007	7	550	79
2008	7	560	80
2009	10	900	90
2010	15	1,525	102
2011	6	755	126
2012	5	675	135
2013	2	70	35
2014	6	630	105
2015	6	440	73
2016	5	440	88
2017	5	625	125
Total	78	7,530	97

* The study team has not been informed whether these projects were under CSR or were mandatory mangrove plantations for the mitigation of environmental impacts.

Source: JICA Study Team (2019) based on the data obtained from GEC.

6.2.2. Rationales

(1) Need for Afforestation in the State

In the India State of Forest 2017, 9,179 km² out of 14,757 km² or 62% of the total forest land is categorized as open forest having less than 40% crown density. The figure is expected to be higher if revenue land is included. Thus, there is a substantial need for afforestation in the state. Further, as reviewed in the previous section, the Forest Conservation Act Handbook provides a basis for

implementing afforestation activities in the open forest area through CSR/Private Partnership. Since Gujarat is home to many industries and corporate houses, the Project should look at resources from corporate houses to be invested in forest ecosystem.

(2) Need for Systematic Approach to Afforestation under CSR/Private Partnership

The findings from the review and field survey suggested that afforestation and mangrove plantation under CSR/Private Partnership are often implemented in pockets and on a small scale. Due to reservation in working with the government, the corporates tend to implement afforestation activities without appropriate technical guidance. On the other hand, the GFD does not yet have a plan or suitable methods that can be easily applied in CSR/Private Partnership-based afforestation activities. Since concerted efforts in greening the state would be more effective, the Project is in the right position to initiate the process by promoting a systematic approach to CSR-based afforestation activities.

(3) Need for Appropriate Technical Facilitation for Afforestation under CSR/Private Partnership

As of now, there is no specialized unit established in the GFD to for CSR/Private Partnership-based afforestation activities. To extend the relevant technical guidance and to facilitate CSR/Private Partnership-based afforestation activities in a systematic way, an appropriate institutional arrangement is required. Such a unit could also mobilise resources for afforestation from the corporate CSR funds, monitor project progress and report to the corporates. For these purposes, establishing a dedicated unit for CSR/Private Partnership-based afforestation activities would be relevant.

6.2.3. Objective

The objective is to integrate CSR/Private Partnership into activities for sustainable forest ecosystem management.

6.2.4. Potential Project Areas for Intervention

The intervention areas are the same as the Project areas. Depending on the geography, CSR/Private Partnership inputs may vary according to the local conditions.

6.2.5. Approach

(1) Addressing the Difficulties Faced by the Corporates

Although the corporates may need to undertake activities to off-set carbon foot prints or get involved in environment related CSR activities to enhance their corporate values, forest ecosystem related activities have not come as their preferred project as they are often met with the following difficulties. Those difficulties include: 1) lack of human resources in planning, implementation, and Monitoring and Evaluation (M&E) in CSR projects; and 2) difficulties in funding, as the sector requires long-term commitment. To address these issues, a dedicated unit will be established within the Project institutional framework. The unit will undertake overall planning and propose projects of various scales so that corporate houses with differing funding capacities can find the right project scale. The unit will also ensure that work is implemented as per the plan, and undertake monitoring and reporting.

(2) Enhanced Monitoring of the CSR Projects

It is often the case that the corporates require proper M&E and reporting of the outputs and outcomes, if not donations. They need to know the tangible/measurable impacts from their CSR investments, especially the work that is done in their names. Since they also need to disclose information on CSR activities in the public domain, having a proper monitoring and reporting mechanism is very important. A dedicated personnel member for M&E and another for documentation will be engaged.

To facilitate monitoring of the Green CSR projects, a web-based monitoring system shall be considered to be developed.

(3) Strategic Publicity and Networking Mechanism

Networking is a key for nurturing an enabling environment for CSR/Private Partnership. The Project will place an officer in charge of Green CSR in PMU who will proactively take part in the state level and district level meetings and organize information sharing workshops at least twice a year. A web-based interactive system for networking and matching could also be established. Exhibitions at the national and state CSR summit and regular publication will also be considered to showcase the Green CSR project. Networking with the association of industries and companies would also be undertaken.

(4) Engaging Community

In this Project, afforestation projects with CSR/Private Partnership will be implemented under a tripartite agreement comprised of a corporate house, JFMC/EDC/SHG or community-based organization (CBO) in the Project area, and the Project. In this way, local communities can take part in the rehabilitation and maintenance work of the forest areas nearby and earn wages, which contribute to their livelihood while augmenting ecosystem services.

(5) Sustainable Financing of CSR Projects by Creating a Fund for Small Investors

Some companies do not yet have the capacity to allocate substantial sums to implement a CSR project on their own, while some may also prefer to donate instead of getting directly involved in the implementation of activities. In such cases, the funds can be collected and invested into some projects jointly. To capture such resources, the Project will create a Green CSR fund and collect donations from such companies. The collected fund will be reinvested into an ecosystem project prepared by the PMU. The same fund could also be used to fill the gap that emerges due to fluctuations in CSR funds.

6.2.6. Activities and Implementation Methods for Sub Component: Integration of CSR/Private Partnership

(1) Preparatory Phase

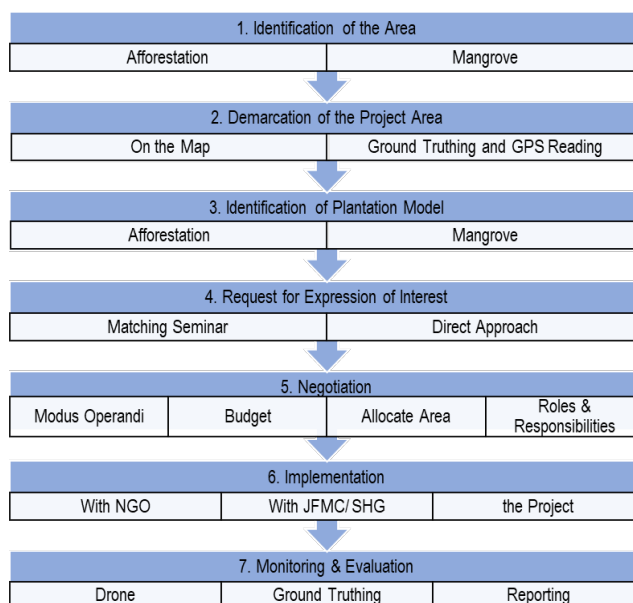
1) Preparation of Manual for CSR/Private Partnership for Afforestation including Mangroves (Plant for Future)

Ministry of Environment, Forest and Climate Change (Forest Conservation Division) has announced the integration of corporate resources and NGO participation in the afforestation activities, with technical guidance provided by State Forest Department vide F. No. 5-2/ 2017-FC dated August 26, 2019. This provides the basis for the manual for afforestation activities under CSR/Private Partnership, including replenishment of the mangrove ecosystem. The draft manual is given in Annexure 6.9. This may be revisited for finalization during the preparatory phase by the PMU and submitted to the PMU executive committee and General Board of the Project for further approval.

(2) Implementation Phase

1) Overall Implementation Framework of Green CSR/Private Partnership Sub-Component

The overall implementation framework of the Green CSR/Private Partnership sub-component is given in the figure to the right. The planning process is comprised of seven steps. In this scheme, the implementation agency will be JFMCs/EDCs/SHGs under the technical supervision of the Project. If there are no JFMCs/EDCs/SHGs found in the area, local CBOs can be engaged for the work. In both cases, a tripartite agreement will be exchanged between the corporate houses, JFMCs/EDCs/SHGs/CBOs, and the Project. The PMU officer in charge will work closely with the respective circle, division and range-level project implementation units established under the PMU in identifying the Green CSR project area including demarcation and identifying the applicable plantation model. In the implementation stage, technical guidance and monitoring will be undertaken jointly by the range-level project implementation unit and PMU officer in charge. The plantation materials will also be procured from the GFD nurseries. Reporting will be done mainly by the PMU officer in charge of the Green CSR/Private Partnership.



Source: JICA Study Team (2019)

Figure 6.10: Implementation Process of Green CSR/Private Partnership Projects

2) Identification of the Area

The implementation begins with the identification of the area for afforestation. The process will be initiated by the PMU officer in charge of Green CSR in consultation with the respective circle, division and range-level project implementation units. Field-level consultations with the potential field-level implementation unit (JFMC/EDC/SHG/CBO) will be carried out with guidance provided by PMU officer in charge and concerned divisions and ranges. The suggested criteria for identification of the site are as below.

- Crown density below 40% and natural regeneration is not possible
- Minimum of 50 ha of geographically contiguous forest land
- Within the Project districts
- Rights over forest resources in the potential sites, communities affected and mitigation measures
- Easily accessible to the public and JFMC/EDC/SHG/CBOs
- Consensus by the JFMC/EDC/SHG/CBO members and other local stakeholders (i.e. Gram Panchayat Sarpanch, sub-committee of Gram Panchayats, Biodiversity Management Committee, ward members and etc.)

In case geographically contiguous forest land cannot be identified for the intervention, revenue forest can also be considered. District wise open forest area is given in the table below and the potential Project districts are indicated in bold. Districts having more than 70% of the recorded forest are marked with “x” in the table below and can be considered as priority districts for the Green CSR project interventions. Since the corporates are likely to invest in areas to which they are closely

associated (i.e. operational area, facilities established, where employees come from, etc.), a few districts may be shortlisted.

Table 6.24: District Wise Recorded Forest Areas by Density Class

Sl. No.	District	Geographical Area in km ²	Very Dense Forest in km ²	Moderate Dense Forest in km ²	Open Forest in km ²	Total of Forest Land	% of Open Forest to the Total of Forest Land	Districts with More than 70% of the Open Forest*
1	Ahmedabad	8,107	0	12	117	129	90.7	X
2	Amreli	7,397	0	63	188	251	74.9	X
3	Anand	3,204	0	18	45	63	71.4	X
4	Banaskantha	10,743	0	372	476	848	56.1	
5	Bharuch	6,509	0	71	243	314	77.4	X
6	Bhavnagar	10,034	0	47	230	277	83.0	X
7	Dahod	3,642	1	118	419	538	77.9	X
8	Gandhinagar	2,140	0	11	81	92	88.0	
9	Jamnagar	14,184	0	55	380	435	87.4	
10	Junagadh	8,831	15	956	663	1,634	40.6	
11	Kachchh	45,674	0	301	2,011	2,312	87.0	
12	Kheda	3,953	0	20	74	94	78.7	X
13	Mehsana	4,401	0	13	146	159	91.8	X
14	Narmada	2,817	20	464	479	963	49.7	
15	Navsari	2,246	18	125	159	302	52.6	
16	Panchmahals	5,231	0	219	518	737	70.3	X
17	Patan	5,792	0	1	101	102	99.0	
18	Porbandar	2,316	0	16	108	124	87.1	
19	Rajkot	11,198	0	3	138	141	97.9	
20	Sabarkantha	7,394	29	304	474	807	58.7	
21	Surat	4,549	5	294	216	515	41.9	
22	Surendranagar	10,423	0	6	169	175	96.6	
23	Tapi	3,139	80	479	251	810	31.0	
24	Dangs	1,766	210	743	415	1,368	30.3	
25	Vadodara	7,546	0	145	484	629	76.9	X
26	Valsad	3,008	0	344	594	938	63.3	
	Total	196,244	378	5,200	9,179	14,757	62.2	

* X: indicates district with high potential for Green CSR project.

Source: India State of Forest 2017, Forest Survey of India.

The mangrove cover of the state has increased more than 200% over the period between 1987 and 2017. However, what we know from the statistics is that the 84.9% of the mangrove area is still open area. Although plantation efforts lead to valuable increments in the mangrove area, it still requires substantial efforts to achieve a healthy mangrove ecosystem. The districts may be selected from the areas where many corporates are located along the coastal belt. Regeneration on revenue land may also be considered for this activity. As for mangrove rehabilitation, projects may also be implemented in collaboration with the GEC.

Table 6.25: District Wise Mangrove Area by Density Class

Sl. No	District	Very Dense Mangrove in km ²	Moderate Mangrove in km ²	Open Mangrove in km ²	Total in km ²	% of Open Mangrove to the Total
1	Ahmedabad	0	1	31	32	96.9
2	Amreli	0	0	2	2	100.0
3	Anand	0	0	8	8	100.0

Sl. No	District	Very Dense Mangrove in km ²	Moderate Mangrove in km ²	Open Mangrove in km ²	Total in km ²	% of Open Mangrove to the Total
4	Bharuch	0	14	31	45	68.9
5	Bhavnagar	0	6	16	22	72.7
6	Jamnagar	0	28	156	184	84.8
7	Junagadh	0	0	3	3	100.0
8	Kachchh	0	118	680	798	85.2
9	Navsari	0	0	14	14	100.0
10	Porbandar	0	0	1	1	100.0
11	Rajkot	0	1	3	4	75.0
12	Surat	0	4	17	21	81.0
13	Vadodara	0	0	3	3	100.0
14	Valsad	0	0	3	3	100.0
	Total	0	172	968	1,140	84.9

Source: India State of Forest 2017, Forest Survey of India.

3) Formulation of Five-Year Action Plan and Annual Work Plan for Green CSR/Private Partnership for Afforestation

The Project will identify the area suitable for CSR/Private Partnership-based afforestation activities. The area should be geographically contiguous and large enough to be worked upon for five years. The total land area shall be demarcated on the map and ground truthing should also be conducted by the PMU officer in charge and the concerned forest guard to record the GPS coordinates. This exercise will be carried out jointly by the PMU officer in charge and the division and range-level Project implementation units. During the planning exercise, following points shall be deliberated upon. While discussing the following points, “Greening of Maharashtra” (pp 9 – 11), produced by Maharashtra Forest Department, may be referred to.

- Tripartite agreement template
- Rights of implementation units (JFMC/EDC/SHG/CBO) over the forest resources (i.e. grass, fuelwood, medicinal plants, etc.) in the Green CSR plantation sites
- Benchmark survival rate⁴⁶
- Consensus on the roles and responsibilities of GFD (circle, division, and range)
- Non-performing JFMC/EDC/SHG/CBO
- Cases in which the plantation is affected by natural calamity
- Cancellation of the contract when the survival rate does not reach the benchmark survival rate set by the Project

The Five-Year Plan can be prepared separately for afforestation and mangrove plantation by the PMU officer in charge in consultation with the respective circle, division and range-level project implementation units. Depending on the identified landscape, a plantation model can be identified by the Project. The annual target for plantation can also be prepared along with the cost of plantation as per the schedule of rates. The initial two years shall be taken as a pilot phase and thus the Project should attempt to complete 15% of the total area during the first and second years of implementation, while 20% of the total area should be allotted for the third and fourth years, and 30% of the area for the fifth year. The prepared strategy and plans shall be submitted to the PMU executive committee and thereafter submitted to the Governing Body for approval.

An Annual Work Plan will be prepared by the PMU officer in charge in close consultation with the respective circle, division and range-level project implementation units at the end of the previous financial year to be approved by the Governing Body of the Project.

⁴⁶ In the case of Maharashtra Forest Department, 50% survival rate after three years was set as a benchmark. When the survival rate is not met, the tripartite agreement is to be cancelled. (Greening of Maharashtra. P 11)

The budget for the Five-Year Plan should be prepared as per the schedule of rates of the GFD and other costs shall be based on prevailing market rates.

4) Preparation of Green CSR/Private Partnership Project Proposals for Corporates

When mobilizing private resources, the Project shall initiate the process of interaction. A project proposal document will provide a basis for effective communication between the stakeholders. The project proposals for corporates shall be prepared by the PMU officer in charge of the Green CSR projects based on the Annual Work Plan. The proposal should contain a description of the project area, what plantation model should be adopted, mode of execution, M&E, reporting, and the budget. The area can be divided into patches of manageable size so that, depending on the budget available with the corporates, the number of patches can be allocated to the interested corporates.

The budget should be calculated according to the schedule of rates of the GFD and prevailing market rates. It should also include two years of maintenance costs, and 15% of the institutional charge. Of which, 70% of the institutional charge will be given to the JFMC/EDC/SHG/CBO as to cover administrative expenses as well as to be utilised for community development. The institutional charges will be disbursed to the JFMC/EDC/SHG/CBO as per the survival rate of the trees.

The duration of each project will be three years, comprised of plantation work (first year), and maintenance/gap filling in the second and third years. The booking for CSR investment is to be done by the end of each financial year so that advanced booking can be done. Bookings and donations can also be made throughout the year, and the seminar by the Project can be held at various locations twice a year.

Table 6.26: Indicative Roles and Responsibilities of Each Party

Concerned Actor	Roles and Responsibilities
Private Partner	<ul style="list-style-type: none"> • Providing Funds • Publicizing Green CSR Interventions by the Project and promoting plantation activities by the corporates
PMU	<ul style="list-style-type: none"> • Signer of the tripartite agreement • Overall technical and managerial supervision and monitoring • Supervision of financial transactions concerning Green CSR projects and CSR fund
Circle	<ul style="list-style-type: none"> • Overall technical and managerial supervision and monitoring • Supervision of the financial transactions concerning Green CSR projects and CSR fund
Forest Divisions	<ul style="list-style-type: none"> • Overall execution of the tripartite agreement • Planning • Identifying corporate partners and implementing organization (JFMC/EDC/SHG/CBO) • Technical supervision of the implementing organization (JFMC/EDC/SHG/CBO) • Providing quality saplings • Site verification • Monitoring (physical and financial)
Range/Concerned Forest Guard	<ul style="list-style-type: none"> • Taking coordinates of the plantation sites • Guiding JFMC/EDC/SHG/CBO members for procurement of the materials, undertaking the plantation works, and watch and ward • Site verification • Regular monitoring (physical and financial)
PMU Officer in Charge	<ul style="list-style-type: none"> • Planning • Identifying corporate partners and implementing organization (JFMC/EDC/SHG/CBO) • Monitoring (physical and financial) • Reporting

Concerned Actor	Roles and Responsibilities
JFMC/EDC/SHG/CBO	<ul style="list-style-type: none"> • Management of Green CSR fund including developing operational manual for the fund • Taking part in site identification • Consensus building among villagers to take part in the Green CSR project • Taking part in the selection of the trees to be planted • Mobilization of laborers • Procurement of planting materials • Undertaking afforestation work as per the technical guidance of the Project • Watch and ward • Record keeping (i.e. financial records, plantation registers)

Source: JICA Study Team (2019)

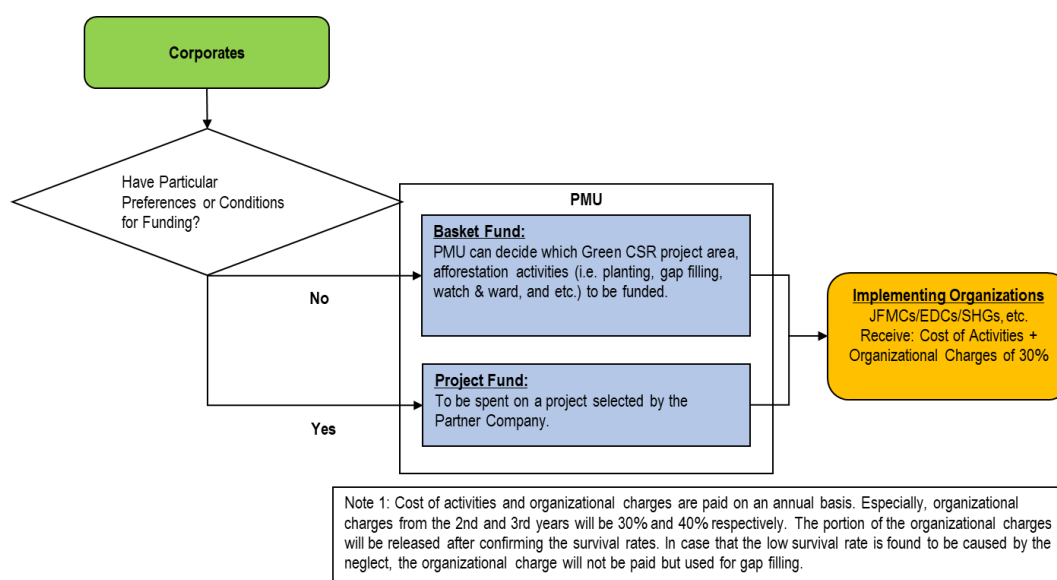
Table 6.27: Indicative Main Cost Component for Green CSR/PP Projects

(a) Cost of Saplings and other planting materials
(b) Wages
(c) Cost of transporting the saplings
(d) Maintenance cost for 2 years
(e) Watch and ward
(f) Organizational Charge of 15% of the total of (a) – (e)

Source: JICA Study Team (2019)

The organizational charge of 15% will be shared between the Green CSR/Private Partnership unit and the implementing agency of JFMC/EDC/SHG/CBO at the rate of 30:70. The community organizations will receive 70% of the organizational charge, and this can be used for community development as per the collective decision taken at the General Body of the JFMC/EDC/SHG/CBO. The 30% of the charge will be retained by the PMU in a separate account to be used when the maintenance/gap filling budget is not sufficient and for the maintenance after the completion of the financing period.

Fund flow is given in the figure below. The Green CSR funds are received from the corporate partners for a particular plantation site, and the funds will be directly transferred from the PMU to the implementing JFMC/EDC/SHG/CBO's bank account. Disbursement will be done in instalment. The first disbursement will be for the cost of the saplings and wages, and 30% of the organizational charge of their share. In the second and third years, the maintenance costs and organizational charge will be transferred to the accounts of JFMC/EDC/SHG/CBO's bank account after confirming the survival rate set by the project each year. However, to prevent malfunctioning of JFMC/EDC/SHG/CBO or low survival rate, regular monitoring and guidance by the concerned forest guard, the concerned project division and the officer in charge in PMU will be carried out.



Source: JICA Study Team (2019)

Figure 6.11: Fund Flow of Green CSR/Private Partnership Project

5) Identification of Corporate Partners and Mobilization of Resources

a. Holding Green CSR/Partnership Seminars

The Project will organize seminars in Ahmedabad and Surat to identify corporate partners. The indicative seminar program is given in the table below.

Table 6.28: Indicative Outline of the Green CSR/Partnership Seminar

Particulars	Description
Venue	Ahmedabad, Surat, Vadodara
Frequency	Once in every six months
No of participants	100 persons (CSR persons in the corporate houses, NGOs, local government officers, etc.)
Programme	Sharing of the details of the Project (objectives, Project area, implementation, funding options, etc.) Response from the corporates Sharing of experience by the JFMC/EDC/SHG/CBO (the second year onwards)

Source: JICA Study Team (2019)

b. Establishing Web-Based Gateway for Raising Fund for Green CSR/Private Partnership

With the intention of effectively interacting with the corporates, a gateway will be established as part of the Project web-site. This gateway should have the investable project proposals prepared by the officer in charge in PMU and should also receive proposals from the corporates. In addition, it should provide free guidance to those corporates that are interested in investing or require technical guidance for forest ecosystem management. It should also provide an option to receive donations as seen in websites such as Swachh Bharat Kosh and Nature Club (in Surat). The maintenance of the gateway shall be done by the M&E/MIS section of the Project.

6) Signing of Tripartite Agreement

A tripartite agreement needs to be exchanged between the private partners, the Project and JFMC/EDC/SHG/CBO engaged for the afforestation activities. Both the existing and newly organized JFMC/EDC/SHG/CBO can be considered as implementing body of the Green CSR project. The agreement should specify the roles and responsibilities of each party, allotted areas of

afforestation, work specification, and financial details, among other matters. There should also be a clear statement that the private sector partners will not have rights over the trees planted and the fruits on the trees, as well as the land where the afforestation work is done. The draft will be prepared by the officer in charge of Green CSR in PMU and reviewed and approved by the Executive Committee of the PMU and Governing Body of the Project.

7) Implementation of Afforestation Activities

Once the tripartite agreement is signed by all concerned parties, the afforestation work will be undertaken by JFMC/EDC/SHG/CBO under the technical guidance of the concerned forest division, range and the forest guard of the respective areas. The required saplings shall be procured from the GFD nursery.

(3) M&E

1) Establishment of CSR Monitoring - Web-Based Platform

PMU officer in charge of Green CSR will undertake monitoring and evaluation of the projects in coordination with the PMU M&E/ MIS section and concerned division and range. As each of the Green CSR/Private Partnership projects will have its own unique monitoring indicators, having a web-based platform would enable timely monitoring by the PMU and facilitate the reporting process. All of the CSR project sites shall be geo-coded.

Drones will be used to take the images of the project sites on a quarterly basis. These images will be made available on the website for each sponsoring company along with the description of the areas and synopses of site observations.

2) M&E Data Collection

Monitoring of the Green CSR project will be undertaken at each site while the fund is received by a corporate. Once the financing period is completed, the plantation site will be monitored under the project monitoring system and looked after by the JFMC/EDC/SHG/CBO that implemented the works and the concerned forest guard. Photo records of the site can be taken twice a year and uploaded on the project website.

Monitoring indicators will be comprised of two indicator groups. One type of indicator concerns with the plantation and the other concerns with the finances and performance of JFMC/EDC/SHG/CBO. Indicative monitoring indicators are given in the table below.

Table 6.29: Indicative Monitoring Indicators for CSR Afforestation Projects

Indicator Type	Indicators	Means of Verification	Person in Charge	Timing
CSR Project Indicators	<ul style="list-style-type: none"> • Number of companies invested • Areas covered by each company • Number of JFMC/EDC/SHG/CBO engaged 	Tripartite Agreement Signed	PMU	Quarterly
	<ul style="list-style-type: none"> • Number of workers engaged (gender segregated) • Amount spent on wages 	Muster roll kept at the JFMC/EDC/SHG/CBO	Division/ Range (Forest Guard)	Monthly
	<ul style="list-style-type: none"> • Amount spent on materials 	Account book maintained by JFMC/EDC/SHG/CBO		Monthly

Indicator Type	Indicators	Means of Verification	Person in Charge	Timing
	<ul style="list-style-type: none"> • Number of saplings procured • Number of saplings planted • Number of saplings survived 	Plantation Register kept by the forest guard/JFMC/EDC/SHG /CBO	Division/ Range (Forest Guard)	Monthly
Plantation Monitoring Indicators	<ul style="list-style-type: none"> • As per the M&E indicator of the GFD 	As per the record kept under the M&E system of the GFD	Division/ Range (Forest Guard)	As per the GFD M&E guidelines

Source: JICA Study Team (2019)

The site-based technical guidance and the field record will be kept on paper by the concerned forest guard. The recorded data will be forwarded from the concerned range to the division. The division will upload the data onto the web-based Green CSR monitoring system. At least in every quarter, the concerned officer from the division and circle will visit the site and provide managerial and technical follow up. Annual site visits shall also be organized by the Project for the contributing corporate houses. During these site visits, concerned divisional and range-level project officer or staff shall accompany.

The Project also welcomes site visits by corporates that are interested in hosting one.

3) Reporting to the Funding Corporates

The monitoring report generated from the MIS system will be made available on the website, where the corporates can also access it as required. The monthly progress report will also be sent to the private partners via e-mail. In case a printed version is required, the Project will provide one upon request. The reporting to the corporates will continue for the duration of a particular project financed by them.

4) Networking

Networking would be undertaken primarily by the officer in charge in PMU. The association of industries and cooperates within and outside of the state (i.e. FICCI, CII, JETRO, etc.) can be contacted to build a network, through which the Project may identify potential collaborators, and also to generate project ideas. Participation in a national and state CSR summit shall also be an annual activity. In addition, local (mostly district level) stakeholders may be invited twice a year to have the Green CSR/Private Partnership project proposals shared with them. The PMU officer in charge will also attend the district level meetings held by the projects for the purpose of networking with the local stakeholders.

5) Publicity/Documentation

The corporates require proper reporting by the Project. The reporting should be concise and easy to read, yet capture the key aspects of the interventions. Success stories can also be documented for the benefit of the Project, as well as for the corporates. Competent private agencies may also be engaged if there is a need to produce such things as videos or publications. The reports will be prepared by the PMU officer in charge of Green CSR.

6) Evaluation of the Five-Year Plan

In the fifth year of the Project, the PMU will assess the Project achievements and take a decision on whether to continue or not. If the activities are to be continued, the second Five-Year Plan should be developed following the process adopted in creating the first Five-Year Plan.

7) Green CSR Project Evaluation and Impact Assessment

The overall project will have the midterm project evaluation, end of project evaluation at the end of the project and impact assessment in the post project period. As part of this exercise, the achievements and impacts of Green CSR project shall be assessed. The cost shall be estimated as part of the overall project Evaluation and Impact Assessment component.

6.2.7. Institutional Arrangement for Green CSR/Private Partnership

Within the PMU of the Project, an officer will be made in charge of Green CSR projects. The officer will plan and monitor Green CSR projects and will coordinate with the concerned circle, divisions, ranges, community level implementation units and funding corporates. The field level implementation will be undertaken by JFMC/EDC/SHG/CBO or any other community organization with the technical guidance of the forest guard in the concerned range. The concerned forest guard also monitors progress on a regular basis.

In case resource organizations are required to assist the community-level implementing organization, they can be engaged as required. The procurement of such organizations shall be undertaken by the PMU following the standard procurement procedures. Collaboration with the GEC on mangrove regeneration activities may be sought.

6.2.8. Financial Management for CSR/Private Partnership

The PMU, as a registered society under the Societies Registration Act 1860, shall have a clause in its by-laws on the management of the CSR fund. Registration with the Income Tax Department for applicable tax exemption for the PMU (Income Tax Act Section 12AA) and for the entities making donations towards Green CSR (Income Tax Act Section 10 (23c)) should also be done during the formation stage of the PMU. A separate account will be kept for the CSR/Private Partnership by the Finance Officer in the PMU. When establishing the PMU, the financial management for CSR/Private Partnership shall be further examined by receiving expert advice from a Chartered Accountant. This shall be documented in the Operation Manual of the PMU.

Fund flow of the Green CSR Projects will follow the overall financial management system of the PMU.

6.2.9. Implementation Plan

Implementation of the Green CSR/Private Partnership will begin with the planning. The commencement of the Project is tentatively assumed to be by the second quarter of 2020 and the last plantation is scheduled to take place in 2026. Thereafter, maintenance work shall be continued by the JFMC/EDC/SHG/CBO. The supervision of the maintenance work shall be undertaken by the concerned range and forest guard.

For soliciting partnerships, a seminar will be organized twice a year, where the project proposal and the experiences of corporates and community level implementing organizations in the Green CSR projects will be shared. At the end of the Five-Year Plan, the achievements and outcomes of the Green CSR projects will be evaluated. As per the results of the assessment, the GFD may decide to continue with the program or to terminate it. The detailed implementation schedule for Green CSR/PP for Afforestation is given in Annexure 6.10.

Table 6.30: Implementation Plan for Green CSR/PP for Afforestation

Activity ID	Activities	2020			2021			2022			2023			2024			2025			2026			2027			2028								
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	
6.2.	CSR/ Private Partnership (PP) for Afforestation																																	
6.2.6 (1) 1)	Preparation of Manual for Afforestation under CSR/ PP (Plant for Future)																																	
6.2.6 (2) 2)	Identification of the Area																																	
6.2.6 (2) 3)	Formulation of Five-Year Plan and Annual Work Plan for Green CSR/ PP																																	
6.2.6 (2) 4)	Preparation of Green CSR/ Private Partnership Proposals for Corporates																																	
6.2.6 (2) 5)	Identification of Corporate Partners and Mobilization of Resources																																	
6.2.6 (2) 6)	Signing of Tripartite Agreement																																	
6.2.6 (2) 7)	Implementation of Afforestation Activities																																	
6.2.6 (3) 1)	Establishment of Green CSR Monitoring Platform																																	
6.2.6 (3) 2)	M&E Data Collection																																	
6.2.6 (3) 3)	Reporting to the Funding Corporates																																	
6.2.6 (3) 4)	Networking																																	
6.2.6 (3) 5)	Publicity/ Documentation																																	
6.2.6 (3) 6)	Evaluation of the Five-Year Plan																																	
6.2.6 (3) 7)	Green CSR Project Evaluation and Impact Assessment																																	

Source: JICA Study Team (2019)

6.2.10. Cost Estimate

<i>Close to the Public</i>

6.2.11. O&M

This component does not create any assets or field level organizations. Further, the funding company will also not have any role in the maintenance of the forest areas beyond the period agreed to in the tripartite agreement.

Table 6.31: O&M of CSR/PP for Afforestation

Item/Institutions	Operator	Maintenance Mechanism
Plantation	Division and Range	<ul style="list-style-type: none"> Monitoring and maintenance of the plantation Technical guidance to JFMC/EDC/SHGs
	JFMC/EDC/SHG/CBO	<ul style="list-style-type: none"> Watch and Ward Gap filling if required.

Source: JICA Study Team (2019)

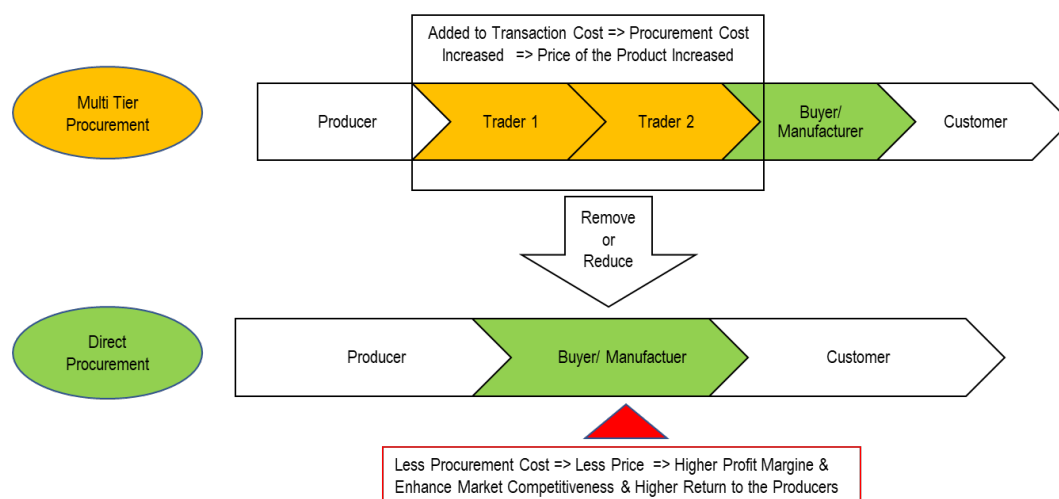
6.3. Scope of Work for Pilot Project for Responsible Supply Chain Development with Private Partnership

6.3.1. Background

In many of the JICA-assisted forestry sector projects, a livelihood component was essential for reducing the pressure on forest resources by promoting alternative means of livelihood. In these attempts, marketing was always a challenge. In GFDP II, organic/wild certification was obtained from CGCERT in order to gain market competitiveness and better prices. However, having the certification did not necessarily attract buyers automatically, but rather the project had to make an effort by approaching potential buyers one by one. In the end, where the organic/wild product market still remains as a niche, the produce was sold along with non-certified produce and fetched only a small margin of profit. What we learn from the previous phase is that certification cannot add an advantage in the market if the buyers do not find value in it.

Furthermore, community organizations such as JFMC/EDC/SHG in GFDP II still require support in production, processing and business development. In the case of Visdalia, support to the cluster has been extended by GFDP II and the GFD nearly for 10 years. In the past projects, it was assumed that the community groups would take off after a few years and become self-sustaining within the project period. However, this assumption may need to be revisited and alternative arrangements for long-term business support may need to be worked out.

Looking at the market, there are companies searching for opportunities to work directly with producers and purchase raw materials or semi-processed materials without engaging the traders. Direct procurement from producers would improve the profit margin of the company by saving on transaction costs in the supply chain. If such companies can be identified and brought into the partnership with the JFMC/EDC/SHG, it will be a win-win situation.



Source: JICA Study Team (2019)

Figure 6.12: Comparison of Supply Chain – Multi Tier Procurement and Direct Procurement

6.3.2. Rationale

The issue of livelihood activities in the previous phase was the lack of market linkage, which we find not only in GFDP II but also commonly in many of the JICA-assisted forestry sector projects. There is a need to develop an alternative approach to strengthen the value chain and effective linkage to the market. The pilot project for responsible supply chain development with private partnership will be implemented to draw lessons to be adopted in the cluster development activities of the Project.

6.3.3. Approach

(1) Partnership for Value Chain Development

The issues that need to be addressed are multi-dimensional and intertwined. Weak market linkage is partly due to weak capacity in production, processing and marketing, both in skills and infrastructure. The issues also derive from insufficient skills in organizational management and business development. What is listed here indicates a need for strengthening the entire value chain of the products of JFMC/EDC/SHG.

For value chain development, two types of private parties can be engaged. One is the company that will procure goods from the JFMC/EDC/SHG. It could provide technical guidance in production and processing and invest in the necessary infrastructure and equipment. In case any certification is required, the company may also invest. The advantages of engaging a buyer from the production stage are: 1) the products are produced per market requirements; and 2) partnership can continue without project engagement if it is economically viable.

The other party consists of NGOs. They will support the JFMCs/EDCs/SHGs in carrying out the activities as per the requirement of the company and assist them in organizational management. The engagement of NGOs is expected to be time bound. However, if the producers group sees a need for their involvement and generates enough profit, they can also be engaged.

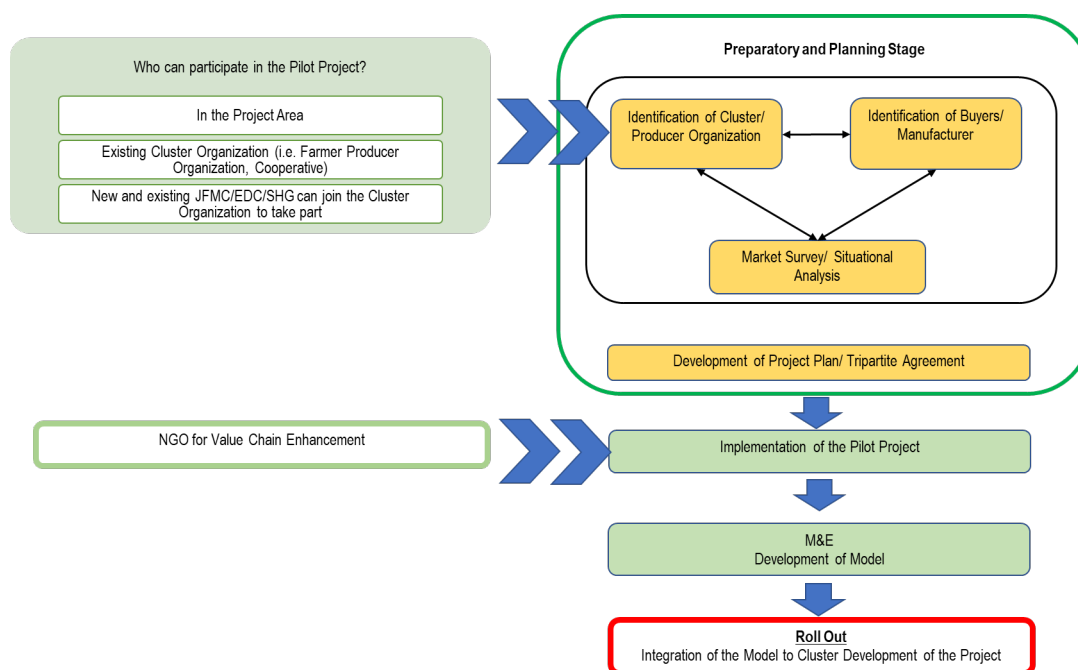
(2) Obtaining Fairtrade Certification by Fairtrade International for Capacity Building and Marketing

As reviewed, the Fairtrade certification system is holistic in nature and provides for the producers' benefit by protecting their rights and environmental aspects in production and business development. Thus, with or without an identified buyer, this certification could enhance the capacity of the producers' organization and, through listing on the website of Fairtrade International, it can provide benefits through exposure to the global market.

6.3.4. Activities

(1) Overview of the Activities

The objective of this pilot project is to develop a replicable model for responsible supply chain development to be adopted by Project cluster development activity. The figure below provides the flow of the activities of the pilot project. During the preparatory and planning stage, the identification of cluster organizations, potential partner companies (buyers/manufacturers) and market/survey and situational analysis will take place in parallel. Information gathered from each activity will inform the other activities to collect relevant information for the development of the project. During the Project implementation stage, NGO will be engaged for the value chain enhancement. Towards the end of the project, the information required for replication of the model will be compiled, the document for which is to be used for the cluster development activity of the Project.



Source: JICA Study Team (2019)

Figure 6.13: Flow of the Pilot Project for Responsible Supply Chain Development

(2) Identification of Cluster and Cluster Organization

Under this Pilot Project for Responsible Supply Chain Development with Private Partnership, existing farmer producer organizations or cluster organizations in the Project areas comprised of existing JFMC/EDC/SHG and those newly established by the Project will be identified to take part in the pilot project. For instance, Farmer Producer Organizations and cluster organizations promoted by GFDP II as listed in Annexure 6.11 and cooperative societies⁴⁷ in the project area may be

⁴⁷ In Gujarat, 75,967 cooperative societies including 9,402 primary agriculture credit cooperative societies (FY 2016-17). (Registrar of Cooperative Societies, Gujarat. <https://rcs.gujarat.gov.in/Images/ccrcs/pdf/31-march-17-info-3.pdf>)

considered as candidates. Potential products could be spices like turmeric, chilies, coriander, and wild honey and herbs. In selecting a product cluster, the following criteria may be adopted.

- A cluster is constituted in a geographically contiguous area.
- It has a sizable production volume.
- It is already organized into a Farmer Producer Organization or any other form of registered body comprised of the members from the Project-assisted JFMC/EDC/SHG with a history of valid business transactions in the past three years.
- There is a collective willingness to make changes in production and processing practices as per the requirement of the buyer.
- No child labour is involved in production and processing.

(3) Market Survey

A market survey shall take place before finalizing the cluster and cluster organizations. While identifying the potential cluster/cluster organizations, the produce that they deal with shall be assessed from the market potential point of view. A market can be identified at different levels, such as local, regional, national and overseas. As for this pilot project, produce suitable for the overseas market shall be identified. Points for examination are not only about the potential business opportunities but also the scope for becoming a player in the responsible value chain. Once the potential marketing channel is identified, the scope for obtaining certification(s) and its economic implication shall also be assessed. The TOR of the market survey shall be prepared by PMC in consultation with PMU.

(4) Situational Analysis

Once the potential product clusters are identified, the relevant production data will be collected. The indicative survey items include: production related data; current market situation and marketing; quality of produce; relevant laws and regulations when exporting produce; and number of families engaged. A subject matter specialist in agricultural marketing may be engaged to undertake this situational analysis. A report shall be prepared based on the findings.

(5) Identification of the Buyer/Manufacturer

Based on the report, PMC specialists will approach the potential buyers including those in the overseas market. Potential buyers can be approached directly or through participation in an exhibition like Broach, if aiming for the organic market. As the process takes time, buyer identification can start simultaneously as cluster identification and situational analysis. At this stage, producers may visit partner companies for negotiation and discussion. A list of potential partner companies is given in Annexure 6.12.

(6) Development of the Project Plan & Signing of Tripartite Agreement

Once a buyer is identified, a project plan will be jointly worked out with it. The roles and responsibilities shall be clearly depicted and a tripartite agreement shall be exchanged between the Project, Farmer Producer Organization (cluster organization), the Project and the partner company. The pilot project shall be for a duration of two years.

(7) Procurement and Engagement of NGO for Supporting Producer Organization

Once the implementation begins, an NGO will be engaged to monitor the production process, provide help in organizational management, such as record keeping, holding meetings, and liaising with the Project. The NGO shall be procured through competitive local bidding. The cost of engaging the NGO shall be borne by the Project. The procurement of the NGO shall begin three months before the

commencement of field activities. The indicative TOR of NGO is given in Annexure 6.13.

(8) Implementation of the Pilot Project

1) Development of Infrastructures for Production, Storage, Processing and Transportation

In strengthening the value chain, infrastructure for production, processing and marketing need to be developed or improved. Although major investment is expected to be made by the partner company, the Farmer Producer Organization shall make its own effort to develop small scale/minor infrastructure through convergence. For instance, the Director of Horticulture, Government of Gujarat provides subsidies for spice cultivation and pest management, and for organic farming and certification. CSR resources could also be considered for the development of micro infrastructure, such as temporary storage, water harvesting and micro irrigation facilities, procurement of farm implements and machinery. Some of the government schemes are given in Annexure 6.14. The National Bank for Agriculture and Rural Development also has loan facilities including the organizational capacity building and market linkage to support the Farmer Producer Organization⁴⁸, which can be considered for strengthening the value chain as a whole. In GFDP II, resources were mobilized from KVK and the Tribal Sub Plan, which can also be considered in this pilot project. The Farmer Producer Organization can also access the fund established under the Project for cluster development, which could also be utilized for the equity capital required to receive loans from financial institutions. Facilitation for resource mobilization will be done by the NGO and PMU officer in charge of livelihood/community development and the concerned division and range-level project implementation unit. When such resources are mobilized, records must be kept to ensure accountability and transparency, and the O&M mechanism shall be defined for the assets created.

2) Technical Guidance for Production, Processing and Marketing

The NGO engaged for the pilot project implementation will provide the Farmer Producer Organization the technical guidance for production, processing and marketing to respond to the requirements of the partner company. It will also liaise with the PMC supply chain specialists, PMU officer in charge of livelihood/community development and the concerned division and range-level project implementation units, and with the local government/stakeholders.

(9) M&E

Day-to-day monitoring will be undertaken by the NGO, who will compile and submit the monthly report to the PMU. PMC Specialists will also undertake regular monitoring and report to the PMU and also to the partner company. Monitoring indicators will be fixed while the Project plan is developed. The Project monitoring indicators are as given below.

Table 6.32: Monitoring Indicators for Responsible Supply Chain Pilot Project

Indicator Type	Indicators	Means of Verification	Person in Charge	Timing
Project Monitoring	• Number of clusters engaged	Tripartite Agreement	NGO	Monthly
	• Number of producers engaged	Record of Farmer Producer Organization		
	• Profit earned			
	• Production Volume			
NGO Monitoring	• Expenditure amount	NGO Monthly Report	NGO	Monthly

⁴⁸

<https://www.nabard.org/auth/writereaddata/File/Annexure%20I%20-%20Support%20available%20under%20PODF.pdf>

Indicator Type	Indicators	Means of Verification	Person in Charge	Timing
	<ul style="list-style-type: none"> Number of personnel engaged Number of days engaged 			

Source: JICA Study Team (2019)

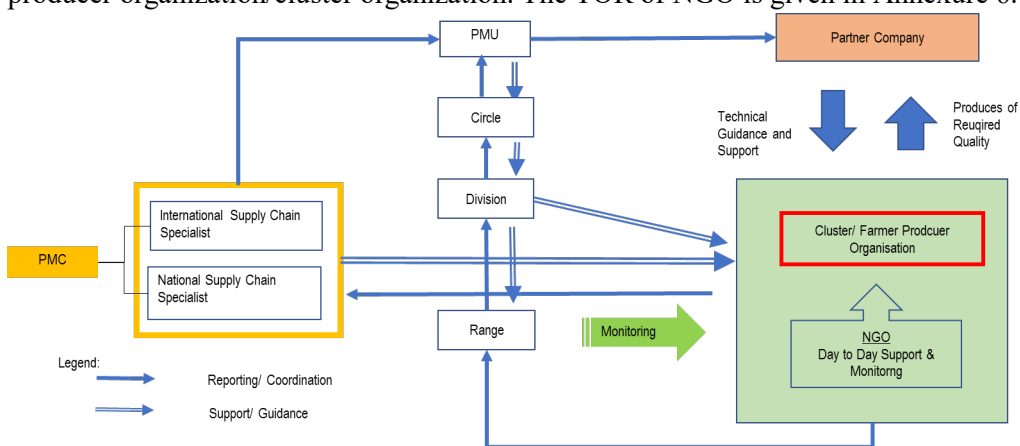
(10) Documentation, Development of Replicable Model and Integration to the Project Cluster Development

Since this is a pilot project, the process and outcome shall be carefully reviewed to draw lessons. PMC Specialists will take the lead in undertaking the assessment and compile a report and prepare recommendations for replication. The PMU officer in charge of livelihood shall review the report and decide what courses of action to be taken. If the replication is deemed relevant, a further project plan will be prepared for 1-3 products and the work will be initiated.

6.3.5. Institutional Arrangement

Since this is a pilot project and requires expertise which may not be readily available within the PMU, one international and one national supply chain specialist may be engaged under PMC. Both specialists should have expertise in responsible supply chain development and management. The national specialist should also be aware of the various certification systems and legalities concerning exports. They will work closely with the PMU officer in charge of Livelihood/Community Development. The circle level project implementation unit will carry out the monitoring and guidance through the concerned division. The division and range-level project implementation units will be engaged while identifying the potential clusters to be taken under the pilot projects and take part in the negotiation with the private companies which will be facilitated by the PMC supply chain specialists. The division and range-level project implementation units will also take part in the site verification. The field implementation structure is given in the figure below. Alternatively, to expedite the process of Project implementation, the Project may engage individual consultants through direct contract mode. The TOR for PMC specialists is given in Annexure 6.15.

Engagement of the NGO is very important, as it will provide the day to day support for the farmer producer organization/cluster organization. The TOR of NGO is given in Annexure 6.13.



Source: JICA Study Team (2019)

Figure 6.14: Institutional Arrangement for Supply Chain Pilot Project

6.4. Financial Management

There will be no direct financial transactions visualised between the partner company and PMC/PMU. It should only take place between the cluster/Farmer Producer Organization and partner company, if

required. Financial monitoring will be undertaken by the NGO and PMC and with an annual audit of the accounts of the cluster/Farmer Producer Organization, to be done by a chartered accountant.

6.4.1. Implementation Plan

The implementation of the Responsible Supply Chain Development Pilot Project is tentatively scheduled to begin during the fourth quarter of 2020 in order to develop a replicable model for the cluster development under the Project. However, if the PMC supply chain specialists can be mobilized early, the activities shall be preponed.

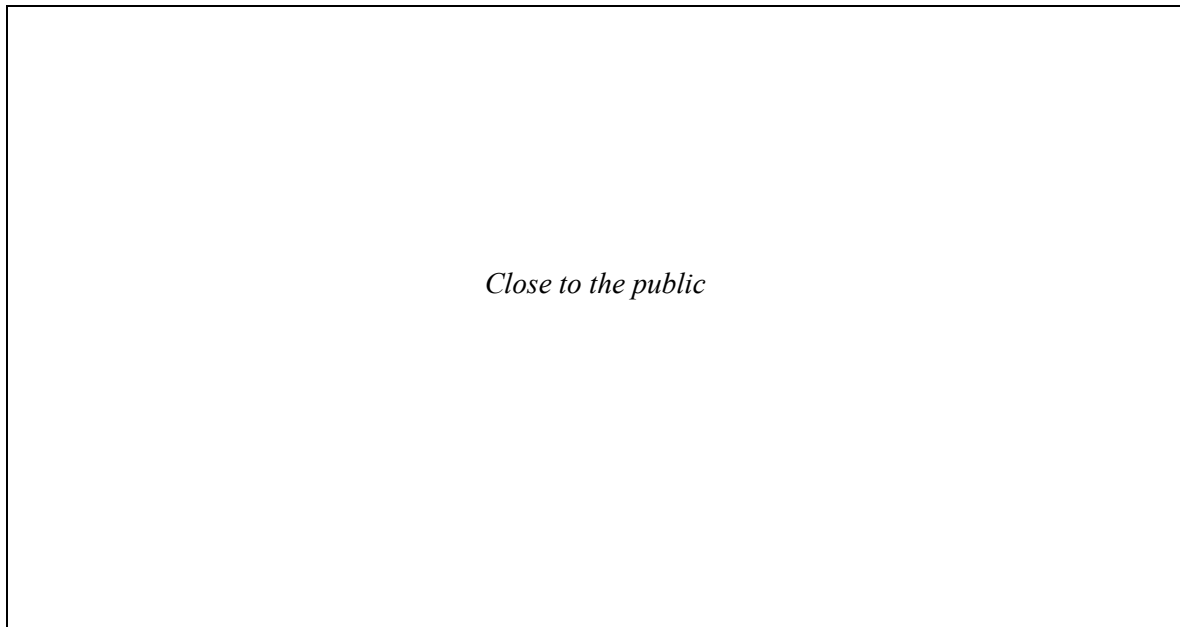
During the first year of implementation, the identification of the cluster/Farmer Producer Organization and administering of the market survey will take place while the partner company is being identified. Thereafter, the pilot project will be developed jointly with it. A tripartite agreement will be signed between the PMU, the Farmer Producer Organization, and the partner company. Implementation is scheduled to begin in the first quarter of 2022 and to continue for 24 months. Once implementation is completed, evaluation will be undertaken and a model for rolling out to other clusters in the Project area will be developed. The rolling out process shall be assisted by the national specialist in the PMC and may also engage NGOs. The detailed implementation schedule for the pilot project for responsible supply chain development is given in Annexure 6.16.

Table 6.33: Implementation Plan for Responsible Supply Chain Development Pilot Project

Activity ID	Activities	2020				2021				2022				2023				2024				2025				2026				2027				2028			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
6.3	Pilot Project for Responsible Supply Chain Development with Private Partnership																																				
6.3.4 (2)	Identification of Cluster/ Producer Organization																																				
6.3.4 (3)	Market Survey																																				
6.3.4 (4)	Situational Analysis																																				
6.3.4 (5)	Identification of the Buyer/ Manufacturer																																				
6.3.4 (6)	Development of the Project Plan and Signing of Tripartite Agreement																																				
6.3.4 (7)	Procurement and Engagement of NGO for Supporting Producer Organization																																				
6.3.4 (8)	Implementation of the Pilot Project																																				
6.3.4 (9)	M&E																																				
6.3.4 (10)	Evaluation of the Pilot Project, Development of Model for Replication and Roll Out																																				

Source: JICA Study Team (2019)

6.4.2. Cost Estimate



6.4.3. O&M

Through the pilot project, some infrastructure may be created by the partner company. The O&M and ownership of such assets will be defined in the Tripartite Agreement that is to be signed at the

beginning of the pilot project.

Table 6.34: O&M of Responsible Supply Chain Development Pilot Project

Item/Institutions	Operator	Maintenance Mechanism
Infrastructure	Producer Organization	<ul style="list-style-type: none">• Producer organization will meet the cost of O&M out of their profits.
Certificate	Producer Organization	<ul style="list-style-type: none">• Producer organization will meet the cost of re-registration out of their profits.• Producer organization may negotiate with the partner company to co-fund the re-registration.

Source: JICA Study Team (2019)

Annexures

Annexure 2.1 : List of Modules Available in eGujForest and Their Purposes

No.	Module	Sub-Module	Purpose
1	Land Management	<ul style="list-style-type: none"> • Administrative Boundaries • Forest Boundaries • Form-I Details • Demarcation & Revenue Record Updation 	<ul style="list-style-type: none"> • This module of MIS application deals with detailed information of forestland, extent and location, area and notification numbers. Every detail of the forestland collected is maintained for reference and management.
2	Establishment (FHRMS)	<ul style="list-style-type: none"> • Staff Management • Legislative Assembly Questions • Right To Information Application List • Court Case Monitoring 	<ul style="list-style-type: none"> • This module deals with administrative issues and keeps record of all the employees of forest department. In addition to this transfer, promotion, ACR, leave, pension, gradation, loan and biodata are also managed in this application. • Other than the employee details the queries raised in the state legislative assembly, Lok Sabha (the lower house of Parliament) and Rajya Sabha (the upper house of Parliament) are managed through MIS for quick reply and tracking. • The information asked for by citizens under the RTI Act is maintained in this application for timely reply. • Several cases filed by the GFD and outside persons are under trial in different courts. The information and status of court cases are maintained in this application for better management, response and tracking of court cases
3	Vigilance	<ul style="list-style-type: none"> • Primary Investigation, • Departmental Enquiry • Suspension Cases 	<ul style="list-style-type: none"> • This module deals with internal illegal practices or misconduct by government officers or employees during the delivery of the government duties. The cases reported against the employees have gone through different processes. The information and status of the cases are maintained and managed in this application.
4	Working Plan	<ul style="list-style-type: none"> • Working Plan • Working Circle • Coup Sequence 	<ul style="list-style-type: none"> • This module deals with the information of the working plan wing of the GFD. Working plans are prepared forest division wise for every 10 years, for systematic forest management. The WP contains working circles, factors for treatable areas, number of felling series and number of coups. The

No.	Module	Sub-Module	Purpose
			WP prescription details per coup area are being entered, accordingly the annual plan of operations (APO) prescribed as per working plan can be drawn from the application and treatments undertaken by the field staff can be monitored.
5	Finance	<ul style="list-style-type: none"> • Subhead wise expenditure • Subhead wise revenue 	<ul style="list-style-type: none"> • This application deals with financial matters. The funds allocated for different activities under head and subhead wise to the field office goes through different levels like the GFD, circle, division and range at different times in a financial year, and monthly subhead wise expenditure done at different levels are entered in the application for better financial management. The achievements according to the targets and maintenance of various registers for financial propriety also can checked from the application. • The field official also collects revenue for various things. The subhead wise revenue collected and deposited in the treasury are updated monthly in this application.
6	Plantation & Nurseries	<ul style="list-style-type: none"> • Treatment Plan • Plantation • Nurseries 	<ul style="list-style-type: none"> • This module deals with core activities like plantations and nurseries. Before taking up the plantation, the treatment plans are prepared consisting of site selection, details of land, prescriptions of working plans, treatable areas, treatments required, species to be planted, number of plants required, requirement of SMC structure, proposed silviculture operations, fund requirement etc. The treatment plans are submitted to division office for approval. After approval of a treatment plan, the frontline staff in the field takes up proposed plantation activities. The seedlings are raised in the nurseries in view of requirements in plantation and maintenance. The details of plantations and nurseries are maintained in various registers in field offices. These details are entered in this module of MIS

No.	Module	Sub-Module	Purpose
7	Monitoring & Evaluation	<ul style="list-style-type: none"> • Nursery Monitoring • Plantation Monitoring 	<ul style="list-style-type: none"> • application. • A standard guideline issued by the GFD called 'Standing Order-08' for the systematic monitoring of nurseries and plantations. The plantations are monitored for five years since creation. The monitoring registers are maintained for plantations and nurseries at the field offices. Every plantation is monitored physically by the division office. Some plantations are also monitored by random sampling by higher officials and some plantations are monitored by engaging outside agencies, called third party assessment. Monitoring records are maintained in this application.
8	Participatory Management	<ul style="list-style-type: none"> • People's Organization (PO) • Self Help Group (SHG) • Executive Committee Registration • Village Survey Details • Micro plans 	<ul style="list-style-type: none"> • The Forest Department, with the participation of local communities, manage some forest areas (similar to JFM). A local community comes together and forms one organization. The organization nominates the members of executive committee to deal with day-to-day management. The target area is surveyed and micro-plans are prepared for systematic management of the target area for five years. The community also forms small groups for micro-financial institutes or enterprises in rural areas for socio-economic development. The details of these organizations and activities are maintained in the application under 'participatory management'.
9	CM Dashboard	<ul style="list-style-type: none"> • - 	<ul style="list-style-type: none"> • The Chief Minister's Office in the Gujarat State has a digital dashboard containing important information for display and monitoring directly by the CM. The required information for what is displayed on the CM dashboard is automatically filtered from MIS application on a daily basis as a web service.
10	Forest Produce	<ul style="list-style-type: none"> • List Marking Registers • Add and approve Tree Data • Felling Register 	<ul style="list-style-type: none"> • The forest produce is maintained in different registers for transparency. This produce is sold later to the bidders. The harvest details are maintained in different registers at

No.	Module	Sub-Module	Purpose
		<ul style="list-style-type: none"> • List Marking Registers completion • Ravangi Patrak (transit permits) register • Maintain Depot Register • Measurement of Materials at Depot • Lotwari Register 	<p>different locations. This information regarding the produce is entered in the application for monitoring and future reference.</p>
11	Offences	<ul style="list-style-type: none"> • Manage First Offence Report • First Offence Report details • Enquiry details • Final order details • Final Heval details • Human Assault details 	<ul style="list-style-type: none"> • This module deals with protection and offences related to forest and wildlife. All details of different types of offences like illicit cutting, encroachment, mining, intentional fire, hunting, boundary alteration, grazing, transit offence, and human assault are maintained in this application. Enquiries about the offences reported are made for better management. The details of the enquiries, progress of enquiries, orders issued, final reports, etc. are entered in this application.
12	Sawmill	<ul style="list-style-type: none"> • View and Manage Applications • Generate License. • License fee details 	<ul style="list-style-type: none"> • This module deals with information for applications received for the renewal or issue of new licenses for sawmills. The applications are received at the division office and the details of application, machinery, sawmill, partner information, location or change of location, transfer of ownership, and renewal of old licenses, along with the process of approval of licenses, is entered in the application for future reference.
13	Wildlife & Eco Tourism	<ul style="list-style-type: none"> • Wildlife management • Eco-Tourism 	<ul style="list-style-type: none"> • The details of wildlife rescue, release, wildlife injury & deaths, human injury & deaths, compensation paid, wildlife population estimations, permission for research and videography, list of ecotourism sites, facilities at ecotourism sites, number of tourists visited, and revenue income are entered and maintained.
14	Malki (special permission for cutting)	<ul style="list-style-type: none"> • Malki application list • Geen kisan credit card details, • Applicant name transfer 	<ul style="list-style-type: none"> • The cutting of five special trees are banned in Gujarat State: Sag, Sisam, Chandan, Limdo, and Kher. Cutting of these trees needs special permission from the Forest Department. Applications for cutting of these trees are received at

No.	Module	Sub-Module	Purpose
			division offices. The details of the applications, including land specifications and list of documents submitted are entered in this module for monitoring.
15	Research & Training	<ul style="list-style-type: none"> • Research • Training 	<ul style="list-style-type: none"> • Information related to departmental research and training is maintained in this application. The candidate plus trees (CPT) are identified as sources or mother trees for collection of quality planting material. The list of CPT, flowering and fruiting records, collection of material (seed, etc.), seed testing and production details, stock allotment, research project agencies, research projects, plot types, research plots, research centres, facilities, fertilizer types, and fertilizer production details are collected and entered in this module for research activities. • Training action plans are prepared and approved, accordingly the training is conducted. Details on training schedule, list of trainees, training attendance and resource details of resource persons are maintained in this module.
16	e-services	<ul style="list-style-type: none"> • - 	<ul style="list-style-type: none"> • The GFD provides some services to the public within the state; out of these, 8 services can be applied for online through the GFD website. Details on different applications are entered in MIS so that the status of applications received and process undergone can be tracked.
17	Green Gujarat	<ul style="list-style-type: none"> • - 	<ul style="list-style-type: none"> • During Van Mahotsav (mass plantation festival) the seedlings are distributed to the public for plantations at their places under the Green Gujarat scheme. The targets and achievements of seedling distribution are entered in this module.
18	Grass Module	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • Grass raised in forests are to meet fodder targets. These grasses are raised in vidis and after harvest are stored in godowns and distributed in the desert area as fodder for livestock and wildlife. Details on grass production, harvest, storage in godowns, distribution, and stock are maintained in this module.
19	IT Cell	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • The required IT hardware and

No.	Module	Sub-Module	Purpose
			software are managed by the IT cell at the GFD. The inventory of HW and SW, and GSWAN connectivity entered in this module
20	MGNREGA	•	• The forest department also pools funds from an MGNREGA scheme for activities under convergence. The details on planned work, total expenditure, and funds received from MGNREGA are entered in this module.
21	Forest Statistics	•	• This module contains yearly reports showing the performance of all wings of the Forest Department.

Source: JICA Study Team (2019) based on interviews with GFD IT Cell

Annexure 2.2 : List of eServices Available in eGujForest and Their Purposes

No.	Application Name	Purpose
1	Farm Land	Assistance is provided to individual farmers for raising plantation in farmland. The income from the plantation will add an extra benefit to the farmer and tree cover will increase outside the forest area. 250 to 1,000 quality seedlings are provided per farmer.
2	Kissan Nursery	This is a decentralised people's nursery where women interested for raising seedlings can apply before August 31. INR 2.20 per seedling are provided in three instalments.
3	Smashaan Sagadi	Firewood for cremation is provided free of cost to villagers where a cremation shed is already constructed. The Village Panchayat constructs the shed. This is encouraged to save fuel wood consumption.
4	Cattle Compensation	Compensation for casualty or death of livestock due to wild animals is provided as per government schedule rates. Individuals need to apply for compensation, and based on the application designated field official will conduct an inquiry and approve based on the facts. After approval funds will be transferred to the applicant.
5	Film Shooting/ Photography Permission	As per the Wildlife Protection Act 1972, film shooting and photography is permitted with prior permission for shooting in protected areas. The interested individuals/organizations need to apply online in advance for shooting.
6	Research Permission	For research on wildlife or forests, individuals/groups/organizations need prior permission from the Forest Department. Interested persons can apply online in advance for permission to do any research work in a forest area.
7	Parapet Wall around open wells	50% financial assistance is provided to individuals to minimize the incidents of wildlife falling in open, unsecured wells. Individuals can apply online for assistance to build a parapet wall around unsecured wells.
8	Sawmill licenses renewal	The owner of a sawmill needs to apply online for the renewal of a license three months before it expires. The applications are verified by the concerned DCFs and renewed as per guidelines.

Source: JICA Study Team (2019) based on interviews with GFD IT Cell

Annexure 3.1 : List of Companies with High CSR Investment

1) FY 2014-15 and FY 2015-16

Rank	FY 2014-15		FY 2015-16	
	Company Name	Billion INR	Company Name	Billion INR
1	Reliance Industries Limited	7.6	Reliance Industries Limited	6.4
2	Oil and Natural Gas Corporation Limited	5.0	NTPC Limited	4.9
3	Infosys Limited	2.4	Oil and Natural Gas Corporation Limited	4.1
4	Bharat Heavy Electricals Limited	2.4	Tata Consultancy Services Limited	2.8
5	Tata Consultancy Services Limited	2.2	ITC Limited	2.5
6	ITC Limited	2.2	Central Coalfields Limited	2.1
7	NTPC Limited	2.1	NMDC Limited	2.1
8	NMDC Limited	1.9	Tata Steel Limited	2.0
9	Tata Steel Limited	1.7	Infosys Limited	2.0
10	ICICI Bank Limited	1.6	Power Finance Corporation Limited	1.9

Source: National CSR Portal, Department of Economic Affairs, Ministry of Finance, Government of India (<https://www.csr.gov.in/index16.php>)

2) FY 2016-17 and FY 2017-18

Rank	FY 2016-17		FY 2017-18	
	Company Name	Billion INR	Company Name	Billion INR
1	Reliance Industries Limited	6.5	Reliance Industries Limited	7.5
2	Oil and Natural Gas Corporation Limited	5.0	Oil And Natural Gas Corporation Limited	4.8
3	TATA Consultancy Services Limited	3.8	TATA Consultancy Services Limited	4.0
4	HDFC Bank Limited	3.1	HDFC Bank Limited	3.7
5	INFOSYS Limited	2.9	Indian Oil Corpn. Limited	3.3
6	NTPC Limited	2.8	INFOSYS Limited.	2.7
7	ITC Limited	2.8	Mahanadi Coalfields Limited	2.4
8	Oil India Limited	2.2	NTPC Limited	1.9
9	Indian Oil Corporation Limited	2.1	Wipro Limited	1.8
10	Wipro Limited	1.9	Housing Development Finance Corporation	1.7

Source: National CSR Portal, Department of Economic Affairs, Ministry of Finance, Government of India (<https://www.csr.gov.in/index16.php>)

Annexure 3.2: District wise CSR Fund Spending in the Project Area

Unit: Million INR

Districts in the Project Area	CSR Spending in Million INR	Education, Differently Aabled, Livelihood	Health Eradicating Hunger Poverty and Malnutrition Safe Drinking Water Sanitation	Rural Development	Environment, animal welfare Conservation of Resources	Heritage Art and Culture
Amreli	82.4	29.0	3.0	36.2		
Anand	14.0	6.9	0.1	6.1		
Banas Kantha	4.8	3.0		1.8		
Bharuch	58.0	24.2	30.3	1.8	0.5	
Bhavnagar	26.3	10.0	4.9	9.1	0.1	
Chhota Udaipur	136.4	25.8	109.6		0.1	0.9
Dang	3.2	1.6	1.6			
Devbhumi Dwarka	0.0					
Gandhinagar	96.1	47.3	12.4	14.3	2.8	15.0
Jamnagar	13.1	11.9	0.1		0.8	
Junagadh	1.6	0.9	0.5			
Kachchh	1.5	0.2	1.1		0.2	
Kheda	1.2		1.2			
Mahesana	3.4	0.5	0.8	1.7	0.4	
Morbi	0.2			0.2		
Navsari	3.4	3.4				
Rajkot	32.1	24.0	6.8	0.5	0.1	
Surat	168.7	103.4	52.9		2.8	2.0
Surendranagar	8.7	0.1	0.3		0.2	
Vadodara	356.5	80.0	258.9	5.4	1.9	2.8
Valsad	68.8	40.4	24.2	1.6	1.0	
NEC/ Not mentioned	6,612.5	2207.8	2557.1	352.8	429.5	812.5
% share in Total		33.4	38.7	5.3	6.5	12.3

Source: National CSR Portal, Ministry of Corporate Affairs. Source: National CSR Portal, Department of Economic Affairs, Ministry of Finance, Government of India (<https://www.csr.gov.in/index16.php>)

Annexure 3.3: CSR Activities of Main Contributors in the Project Areas (Data as of August 2019)

District	Company Name (Source 1)	FY 2017-18 (Million INR) (Source 1)	CSR Activities for FY 2017-18 (Source 2)
Amreli	Gujarat Pipavav Port Limited	81.9	Health and nutrition for children, adolescents and mothers; skills entrepreneurship development and placement; livestock development; construction of sanitation units; roof rain water harvesting clean water supply; solar street lights, etc.
Amreli	Mehul Real Tors Private Limited	0.5	No information available
Banaskantha	APCOTEX Industries Limited	2.9	Health: financial contribution to the child care center; scholarship for underprivileged students
Banaskantha	Duke Plasto Technique Private Limited	2.0	Education and sanitation
Bharuch-Ankleshwar, Jhagadia, Dahej	UPL Limited	58.8	Skills development, entrepreneurship development for SHGs, agriculture development, social forestry, solar water pump, mangrove plantation, support for eco-clubs in schools, developing medicinal plants in schools
Bharuch	Century Enka Limited	13.7	Established industrial training institute in contribution; support for placement; drinking water supply, street lights, tree guards for tree plantation
Bharuch	JB Chemicals and Pharmaceuticals Limited	13.0	Donation for hospital and electrical crematorium
Bharuch	Gujarat Alkalies and Chemicals Limited	7.5	Contribution to vocational training center for tribal students; student support for skills training and start-up; donation of fishing kits; infant, child and maternal health
Bharuch	Gujarat Guardian Limited	6.8	Contribution for construction of school hall, household toilets in rural areas
Bharuch	Bharuch Enviro Infrastructure Limited	5.6	Construction of toilet under Swachh Bharat Abhiyan
Bharuch	Deepak Nitrite Limited	2.6	Promoting livelihood for differently-abled
Bharuch	K Patel Chemo-Pharma Private Limited	2.5	Livelihood project
Bharuch	Chiron Behring Vaccines Private Limited	2.1	Healthcare
Bharuch	Resins and Plastics Limited	1.5	Education
Kheda	Symphony Limited	3.5	Promoting education and Vocational Training
Kheda	Ceejay Tobacco Limited	1.2	Donation for Healthcare
Kheda	Gujarat Tea Processors and Packers Limited	0.5	Support to vocational training Centre ("MARG"), income generation projects for women

District	Company Name (Source 1)	FY 2017-18 (Million INR) (Source 1)	CSR Activities for FY 2017-18 (Source 2)
Navsari	Newtronic Lifecare Equipment Private Limited	3.4	Education
Navsari	TATA Investment Corporation Limited	0.9	Contribution towards setting up of a new science laboratory/repairing furniture
Navsari	Peass Industrial Envineers Private Limited	0.5	Health (Eye care)
Navsari	Oerlikon Textile India Private Limited	0.1	Skills Development
Sabarkantha	Asian Granito India Limited	5.5	Education
Sabarkantha	Gujarat Tea Processors and Packers Limited	2.5	Support for construction of new school/college building
Sabarkantha	Pioneer Investcorp Limited	2.1	Rural Educational Development Project
Sabarkantha	Spectrum Johnson Tiles Private Limited	0.2	Livelihood enhancement for persons inflicted with leprosy and persons with mental disability
Sabarkantha	APCOTEX Industries Limited	0.1	Education
Surat	Bodal Chemicals Limited	10.0	Donation
Surat	Hazira LNG Private Limited	4.9	Sustainable livelihood, coastal eco-restoration project, horticulture program
Surat	L&T- MHPS Boilers Private Limited	4.2	Skill Development
Surat	L&T Howden Private Limited	2.5	Health Care & Education
Surat	Moldex Composites Private Limited	0.8	Health Care
Surat	Gujarat Colorlam Private Limited	0.8	Poverty, Eradicating Hunger, Malnutrition
Surat	Optima Farm Solutions Limited	0.6	Health care
Surat	L&T Infrastructure Finance Company Limited	0.5	Relief Fund- Rural development projects
Surat	Ronuplate Private Limited	0.5	Donation, Education
Surat	Gujarat Chemical Port Terminal Company Limited	0.3	Rural Development
Vadodara	Transpek-Silox Industry Private Limited	11.1	Women's empowerment through SHGs; street light installation, conservation of natural resources, water pump construction, toilets, and tree plantation
Vadodara	Deepal Nitrite Limited	10.5	Rainwater Harvesting

District	Company Name (Source 1)	FY 2017-18 (Million INR) (Source 1)	CSR Activities for FY 2017-18 (Source 2)
Vadodara	GE T&D India Limited	8.1	Skill building and vocational training, Village development
Vadodara	L&T Hydrocarbon Engineering Limited	8.1	Infrastructure improvement for community development centre, government hospital, dairy cluster, and primary school
Vadodara	Transpek Industry Limited	6.4	Environmental sustainability, women's empowerment
Vadodara	Sabic Innovative Plastics India Private Limited	5.4	Infrastructure and equipment
Vadodara	Voltamp Transformers Limited	5.1	Donations
Vadodara	Panasonic Energy India Company Limited	4.0	Donations
Vadodara	Manpasand Beverages Limited	3.8	No information available
Vadodara	Rubamin Limited	3.5	Rural drinking water supply, cultural program and education
Valsad	UPL Limited	49.5	Same as above
Valsad	M3 Investment Private Limited	21.5	Education
Valsad	JB Chemicals and Pharmaceuticals Limited	10.0	Donations
Valsad	Minix Holdings Private Limited	6.6	Education
Valsad	Maheshwari Logistics Limited	5.6	Donations
Valsad	RBL Bank Limited	2.5	Contribution to the Atul Rural Development Fund
Valsad	Rudolf Atul Chemicals Limited	2.5	Constructing individual household toilets in villages
Valsad	Atul Bioscience Limited	1.7	Improvement of hygiene through construction of individual household toilets
Valsad	Mitsu Private Limited	1.7	Education
Valsad	Mixon Holding Private Limited	1.2	Education
Total		415.8	

Source 1: National CSR Portal, Department of Economic Affairs, Ministry of Finance, Government of India (<https://www.csr.gov.in/index16.php>) (Data on the portal has been updated. The figures may vary.)

Source 2: Compiled from various sources including CSR Box website <https://csrbox.org/> and CSR report of each company.

Annexure 3.4: CSR Activities of Japanese Companies and Their Associates

Sl. No	Companies Identified (Source 1)	Brief Outline of CSR Activities (Source 2)
1	Sojitsu India Private Limited (Gandhidam Office)	Contribution to Prime Minister National Relief Fund (2017-2018)
2	Toray International India Private Limited (Head Office)	No information found
3	Toray Kusumgar Advanced Textile Private Limited.	No information found
4	Excel Crop Care (Sumitomo Chemical)	No information found
5	Konica Minolta Business Solutions India	No information found
6	Bridgestone India	Announced women's empowerment program in Pune in collaboration with FICCI (4 million INR); mostly for skills training
7	TOTO India Industries	No information found
8	Daikin Air-conditioning India Private Limited	No information found
9	Mitsubishi Electric India Pvt. Limited	Mitsubishi Electric Corporation, as a whole, places an emphasis on the forest, river adoption, and other kinds of environmental conservation. In India, tree planting activities with school children were carried out in 2013 and 2014 (in Gurgaon both years). In 2015, 9,500 saplings were planted in Pune.
10	Omron India	In 2013-14, donated digital books for the visually impaired with the National Association of Blind, Delhi; 2015-16, conducted health camps in Delhi; 2017, demonstration of production of cherry tomatoes and yellow capsicums by poly-house farming technology in Gurgaon; 2018, conducted IT training jointly with NABET in Gurgaon.
11	Epson India	EPSON India Private Limited places emphasis on education. Donations of exercise books for children in government schools in western Karnataka and western Maharashtra have been made.
12	Panasonic India	Ecoskool – an environmental sensitization program in across India; works with state agency for rural development and assisted primary and secondary schools in a techno park in Jhajjar; also works for the strengthening of rural education (infrastructure, soft skills, capacity building, etc.); community health service (i.e. counselling, health awareness camps; school health camps; training for ASHA workers; a mobile health van; IT literacy, English, social networking, etc.; for livelihood opportunities by setting up training institutes in Jhajjar and Delhi; scholarship for Japan; women's empowerment - education and vocational training; rural agriculture + biogas for cooking and lighting, vermicompost, in Jhajjar; and distribution of solar lanterns (lanterns in Bihar, Andhra Pradesh, Odisha, West Bengal and Haryana.), a football academy for youth, and office waste recycling
13	Sony India	Sony takes CSR beyond a one-time donation; contribution to education using Sony technology, with the Sony Global Education/NIIT Foundation in Delhi, Odisha, Andhra Pradesh, Maharashtra, and Karnataka. Sony model village - community infrastructure + youth skills development; skills training for women;

Sl. No	Companies Identified (Source 1)	Brief Outline of CSR Activities (Source 2)
		promotion of Kishan club, WASH, promotion of sports, entertainment products (Partner NGO SEED); Environmental conservation with WWF India - community based tourism including the development of special tour packages and publicity materials; the donation of lenses to record animals and landscapes for wildlife/biodiversity monitoring contributes to developing and implementing effective solutions to human and snow leopard conflict by framing management rules and regulations in Arunachal Pradesh; elderly care; tree planting and zero-budget natural farming
14	Denso India	Conducted traffic safety campaigns; in areas identified as education and environment - empowerment of women, support for the elderly, promotion of health care in rural areas (seems yet to start implementation)
15	Toyota Kerloskar Motor	Skills development, road safety, education, and the environment; for the environment, they have done lake rejuvenation and assisted a school environmental program; promotion of digital literacy; school sanitation; for school sanitation, Swachh Bharat Swachh Vidyalaya support for female child sanitation/sanitation education in school
16	Multi Suzuki India	Skills education, health
17	Honda Motorcycle and Scooter Private Limited	Health and sanitation; promotion of sports; solar street lights/solar light donation in Gujarat, Haryana, Rajasthan, and Karnataka; environmental work with Mukhyamantri Jal Swavlamban Abhiyan on rainwater; education on harvesting in Rajasthan, with cotton bag distribution, tree plantation, construction of gaushala (protective shelters), water conservation in Rajasthan, agroforestry models (in Gurgaon)
18	Yamaha Motors	For skills development, training institute in Chennai was opened. Long term contribution to skills development of youth.
19	Canon India	Eye care, education, environment (tree plantation and rain water harvesting); UNICEF Awaaz Do campaign (sensitization); UNESCO India (World Heritage) organized small exhibition for children; collection of clothes and donations; marathons; blood donations/collaboration with WWF's Earth Hour/National Geographic Channel; keen to collaborate for publication/promotion of CSR
20	Ricoh India	Works with TERI on the Light a Billion Lives campaign (donations of solar lanterns)
21	Unicharm	Unicharm India Private Limited's CSR team conducted an awareness event on mothers and baby care on 6 June 2018 in the Palghar District of Maharashtra in collaboration with Municipality Corporation. Unicharm India supported the 'Poshan Abhiyan' launched by the Government of India, which focuses on women's and children's health by educating mothers on baby care. There was a distribution of their own brand's baby diapers and sanitary napkins.
22	Max Life Insurance (Sumitomo Mitsui Financial Group)	Financial literacy training program; literacy, health, the environment, and skills development; healthcare camps; Max India Foundation works on village sanitation, safe drinking water, and environmental protection; skills training for youth
23	Mizuho Financial Group	Financial Literacy Program at 5 branches in India using materials developed by the Reserve Bank of India (Financial Inclusion Plan); worked with NGOs in Ahmedabad, Bangalore, Chennai, Mumbai and New Delhi. Trained students and youth (basics of banking, opening of bank accounts, security features of currency notes, household budget management, prudent spending and savings; study tours to Financial Inclusion Research Centre in Bangalore, Digital Gallery in Chennai and Monetary Museum in Mumbai; and educational

Sl. No	Companies Identified (Source 1)	Brief Outline of CSR Activities (Source 2)
		programs for women in Mumbai).
24	Tokyo Marine Holdings	Donation to International Society for Mangrove Ecosystems. In Gujarat, a CBO is engaged for mangrove regeneration in the Gulf of Kambhath. Monitoring and technical guidance is provided by the International Society for Mangrove Ecosystems and monitoring report is sent to Tokyo Marine Holdings on a regular basis.
25	KDDI	No information found
26*	Claris Lifesciences Limited (Otsuka Pharmaceuticals)	Rural development; supported Indian coast guard week; donation for visually impaired people's health; education and protection of national heritage; training; and waste management
27*	Mitsubishi Heavy Industries	2014-15-16: financial contribution to Prime Minister's National Relief Fund (2 mil, 1.8 mil, 1.5 mil INR in respective financial years)
28*	KYB	Distribution of saplings in India as a group
29*	Asahi India Glass	Education and medical facilities for children and women; water and sanitation; school bus services. The company could not spend the full planned amount for CSR, thus this year they intend to improve on spending.
30*	YKK	Donation of sewing machines for women so that they can stitch school uniforms for livelihood
31*	Nippon Paint	A program to train youth in painting and interior decoration
32*	Toyota Tsusho	No information found
33*	Pentel Stationery India	No information found
34*	Sumitomo Corporation India Private Limited	Donation to Prime Minister's Relief Fund

Source 1: List of Japanese Firms in India (Embassy of Japan) (https://www.in.emb-japan.go.jp/Japanese/2018_co_list_jp.pdf); FTSE Blossom Japan Index Constituents June 2019 Review (<https://research.ftserussell.com/products/downloads/ftse-blossom-japan-constituentlist.pdf>)

Source 2: Compiled from various sources, including CSR Box website <https://csrbox.org/> and CSR report of each company.

Remarks: Companies with serial numbers with * were not listed in FTSE Japan Blossoms Constituents (June 2019)

Annexure 3.5: Community-Based Mangrove Afforestation Project – A Case Study

Particulars	Description/Data
Project Period	1 year + maintenance period in 2 nd year
Implementing Agency	Morkantha Tavvar Vikas Samiti, Kantiyajal, Bharuchi District
Financing Company	Bayer Crop Science, Bharuch GSPC Pipavav Power Co. Ltd., Gandhinagar Gujarat Pipavav Port Ltd., Mumbai Pipavav Shipyard, Kantiyajal Coastal Gujarat Power Ltd., TATA Power KRIBHCO Kantiyajal, Di. Bharuch, Coastal Gujarat Power Ltd., TATA Power Welspun
Other Stakeholders Involved	SAVE-VIKAS, GEC
Project Area and Reasons for Selecting the Area:	
<p>SAVE-VIKAS conducted a survey in Kantiyajal, Bharuch District in 1997-98 and selected this area as a potential mangrove plantation site. It is believed that wherever mud-skipper are found, mangroves can grow. The mangrove plantation was undertaken in Kantiyajal, Bharuch District with funding by corporates as follows:</p> <p>2007-08 - Bayer Crop Science, Bharuch, 10 Ha 2008-09 - GSPC Pipavav Power Co. Ltd., Gandhinagar, 10 Ha 2009-10 - Gujarat Pipavav Port Ltd., Mumbai, 300 Ha 2009-10 - Pipavav Shipyard, Kantiyajal, 5 Ha 2010-11 - Coastal Gujarat Power Ltd., TATA Power, 500 Ha 2010-11 - KRIBHCO Kantiyajal, Di. Bharuch, 100 Ha 2012-13 - Coastal Gujarat Power Ltd., TATA Power, 200 Ha ----- 2018-19 - Information not available 2019-20 - Welspun</p>	
Reasons for the company to implement the project:	
Companies were required to undertake mangrove plantations to fulfill their need to meet statutory requirements. They approached agencies like GEC and utilized their services to undertake mangrove plantations. <i>(Based on inputs from GEC)</i>	
Project Objectives:	
<p><i>Objectives for companies:</i> To meet their statutory requirements. <i>Objectives for GEC:</i> To support corporate/industries to develop mangrove plantation, to meet the government's goals to increase overall mangrove spread across the coast line of Gujarat, improve environment quality, and support community. <i>Objectives for the community/committee:</i> To reduce the erosion of the coast to sea water, reduce salinity ingress, increase the productivity of farmland near the coast, providing livelihood to the local community, and reduce migration.</p>	
Project Budget:	
Effectively the project runs for 7-8 months, right from seed collection (July) to plantation (January). Samiti engages the local community for this period. The average annual fund flow will be equal to the total cost for the project site. Per hectare cost: INR 25,000 is paid by GEC to the Samiti.	
Project Activities:	
Permission from the collector; Accounting, book keeping & record maintenance Site selection Seed collection	Seed preparations Nursery preparations Maintenance Plantation Monitoring

Roles and Responsibilities of the Stakeholders/Implementation Arrangement:	
GEC: Sensitizing community Getting necessary permissions Site selection and Technical support Monitoring & Reporting Accounting & Book keeping Coordination	Samiti: Execution of the project Maintaining records and accounts Engaging local community & supporting their livelihood Ensuring safety of plantation from human activities
Monitoring System/Monitoring Arrangement:	
Representatives from funding companies visit the sites, and they document the progress for reporting. GEC prepares project progress reports with inputs from Samiti. These reports are submitted to the company.	
Project Achievements:	
Since 2000, the Samiti has developed mangrove plantations of 1,200 hectares in total.	

Source: Based on the field interview conducted by the JICA Study Team in October 2019.

Annexure 3.6: MFP Collection and Sales Value of GFDC Except Teak Stumps and Timur Leaves in Gujarat

Sr. No	Name of Produce	FY 2009-2010		FY 2014-15		FY 2015-16		FY 2016-17		FY 2017-18			
		Production (in MT)	Total Expenditure (thousand INR)	Sale Value (thousand INR)	Production (in Quintal)	Sale Value (thousand INR)	Production (in Quintal)	Sale Value (thousand INR)	Collection (in Quintal)	Total Expenditure (thousand INR)	Collection (in Quintal)	Total Expenditure (thousand INR)	Sale Value (thousand INR)
1	Bamboos		0.0	0.0	73,515.5	48,538.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	Grass		0.0	0.0	135,130.0	99,280.0	161,716.4	126,185.0	0.0	0.0	0.0	0.0	0.0
3	Kakaya Gum	0.4	2.0	6.0	19.2	419.0	1.2	24.0	1.1	12.0	0.0	0.0	0.0
4	Other Gum	309.9	3,434.0	4,962.0	1,429.6	5,534.0	450.3	6,067.0	280.0	1,659.0	3,063.0	162.7	1,374.0
5	Aritha	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	118.0
6	Amila	301.7	1,839.0	1,017.0	6.0	27.0	6.5	29.0	0.0	0.0	382.0	0.0	109.0
7	Karanj Seeds	32.1	12.0	43.0	31.1	65.0	49.3	136.0	0.0	0.0	0.0	0.0	44.5
8	Purwad seeds	3,737.4	977.0	0.0	20.5	28.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	Mahuda seeds	550.0	508.0	829.0	1,209.5	2,003.0	0.0	0.0	616.5	986.0	2,643.0	0.0	0.0
10	Mahuda Fruits		0.0	0.0	0.0	0.0	9,100.4	16,101.0	0.0	0.0	0.0	1,007.5	2,123.0
11	Mahuda Flowers	0.0	1,943.0	0.0	3,851.3	6,124.0	9,243.5	18,277.0	2,452.8	6,132.0	8,095.0	16,044.0	5,275.0
12	Wax	1,754.9	118.0	5,242.0	9.7	76.0	4.7	46.0	12.4	111.0	196.0	5.4	53.1
13	Honey	0.0	4,945.0	0.0	515.2	2,911.0	413.0	3,127.0	1,326.2	9,284.0	0.0	863.3	8,285.6
14	Lambodi Seeds	1,161.9	362.0	17,837.0	535.8	356.0	0.0	0.0	0.0	0.0	0.0	3.0	8.3
15	Karanjyot	485.5	657.0	182.0	6.3	7.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
16	Baheda Fruits		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	117.3	178.0
17	Fruits	224.8	341.0	435.0	0.0	0.0	0.0	0.0	61.0	24.0	0.0	0.0	0.0
18	Charoli Seeds		0.0	0.0	25.5	99.0	125.0	93.0	0.0	0.0	0.0	0.0	0.0
19	Khati Amli		0.0	0.0	0.0	0.0	489.7	1,383.0	0.0	0.0	0.0	0.0	0.0
20	Others (Misc.)	102.9	3,547.0	217.0	2,189.5	3,864.0	9,295.2	7,843.0	152.3	8,696.0	294.0	14.2	246.2
													2,353.0

Remarks: Figures for FY 2013-14 need verification and thus are not included.

Source: Compiled from Gujarat Forest Statistics (<https://forests.gujarat.gov.in/guj-forest-statistics-pv.htm>)

Annexure 3.8: MSP as of December 2018 and MFP Availability in Gujarat

Sl. No	Name of MFP	Scientific Name	MSP (INR per kg)	Availability in Gujarat *
1	Tamarind with seeds	<i>Tamarindus indica</i>	31	○
2	Wild honey		195	○
3	Gum Karaya	<i>Sterculia urenus</i>	98	○
4	Karanj seeds	<i>Pongamia pinnata</i>	19	○
5	Sal seeds	<i>Shorea robusta</i>	20	○
6	Mahua seeds	<i>Madhuca longifolia</i>	25	○
7	Sal leaves	<i>Shorea robusta</i>	30	○
8	Chironji pods with seeds	<i>Buchanania lanzan</i>	109	○
9	Myrobalan	<i>Terminalia chebula</i>	15	○
10	a) Rangeeni lac; b) Kusumi lac		130/203	○
11	Kusum seeds	<i>Schleichera oleosa</i>	20	○
12	Neem seeds	<i>Azadirachta indica</i>	23	○
13	Puwad seeds	<i>Cassia tora</i>	14	○
14	Baheda	<i>Terminalia bellirica</i>	17	○
15	Hill broom grass	<i>Thysanolaena maxima</i>	30	
16	Dry shikakai pods	<i>Acacia concinna</i>	43	
17	Bael pulp (dried)	<i>Aegle marmelos</i>	27	○
18	Nagarmotha	<i>Cyperus rotundas</i>	27	
19	Shatavari roots (dried)	<i>Asparagus racemosus</i>	92	○
20	Gudmar/Madhunashini	<i>Gymnema sylvestre</i>	35	○
21	Kalmegh	<i>Andrographis paniculata</i>	33	○
22	Tamarind (de-seeded)	<i>Tamarindus indica</i>	54	○
23	Guggul	<i>Comiphora wightii</i>	700	○
24	Mahua flowers dried	<i>Madhuca longifolia</i>	17	○
25	Tejpatta (dried)	<i>Cinnamomum species</i>	33	
26	Jamun dried seeds	<i>Syzygium cumini</i>	36	○
27	Dried amla pulp (de-seeded)	<i>Phyllanthus emblica</i>	45	○
28	Marking nuts	<i>Semecarpus anacardium</i>	8	
29	Soap nuts dried	<i>Sapindus emarginatus</i>	12	○
30	Bhava seed/Amaltas	<i>Cassia fistula</i>	11	
31	Arjuna bark	<i>Terminalia arjuna</i>	18	○
32	Kokum (dried)	<i>Garcinin indica</i>	25	
33	Giloe	<i>Tinospora cardifolia</i>	21	○
34	Kaunch seeds	<i>Mucuna pruriens</i>	18	○
35	Chirata	<i>Swertia chirayita</i>	29	

Sl. No	Name of MFP	Scientific Name	MSP (INR per kg)	Availability in Gujarat *
36	Vaybidding/Vavding	<i>Embelia species</i>	81	○
37	Dhavai phool dried flowers	<i>Woodfordia fruticosa</i>	32	
38	Nuxvomica	<i>Strychnos nux-vomica</i>	36	
39	Ban tulsi leaves	<i>Ocimum tenuiflorum</i>	19	
40	Kshirni	<i>Hemidesmus indicus</i>	30	
41	Bakul dried bark	<i>Mimusops elengii</i>	40	
42	Kutaj dried bark	<i>Holarrhena pubescens</i>	27	
43	Noni/Aal dried fruits	<i>Morinda citrifolia</i>	15	
44	Sonapatha/Syonak pods	<i>Oroxylum indicum</i>	18	
45	Chanothi seeds	<i>Arbus precatorius</i>	39	
46	Kalihari dried tubers	<i>Gloriosa superba</i>	27	
47	Makoi dried fruits	<i>Solanum nigrum</i>	21	
48	Apang plant	<i>Achyranthes aspera</i>	24	
49	Sugandhmantri roots/tubers	<i>Homalomena aromatica</i>	33	

* Availability of MFPs was based on the interview with GFDC held in July 2019.

Source: Ministry of Tribal Affairs. (<https://tribal.nic.in/writereaddata/Schemes/RevisionofMSP26122018.pdf>)

Annexure 3.9: Location Map of the PPP Projects in Japan



Source: Edited by the JICA Study Team (<https://free-webdesigner.com/freejapanmap>)

Annexure 6.1: Part of Referenced Japanese Domestic Technologies

No.	Project Name	Site Location	Japanese Implementer	Summary (Relevant words are shown in bold letters.)	Relevant Section
1	Near Real-Time Provincial Deforestation Monitoring System	Laos	<u>JICA</u>	<p>To establish a system to monitor the results and impacts of respective interventions on protection, conservation and production forest area by using Satellite RS on the Google Earth Engine platform, which enables simple and practical operation in deforestation area identification, on-site verification and reporting.</p> <p>Source: <u>JICA</u></p>	6.1.1 (2)
2	Crop Acreage and Production Estimates, Almost-Real-time Monitoring-Based on Satellite RS and Machine Learning Technologies	India	Amnex Infotechnologies Pvt. Ltd. (Supported by <u>Hitachi India Pvt. Ltd.</u> and <u>Hitachi Solutions, Ltd.</u>)	<p>Satellite RS was used to estimate crop acreage and crop yield and check the submitted insurance with precision. In particular, this project used high temporal and spatial resolution satellite images. Drones are also used to survey inaccessible flooded areas. Further, Web applications were developed to distribute the data and information, and reports were prepared according to village and crop type.</p> <p>Source: https://www.hitachi-solutions.co.jp/company/press/news/2018/0509.html</p>	6.1.1 (1) 6.1.2 (3)
3	Feasibility Study for Plantation	Indonesia	<u>Marubeni Corporation, Hitachi,</u>	<p>Satellite and drone images as well as ground data are used for obtaining Digital Surface Model (DSM) and Digital Elevation Model</p>	6.1.1. (4)

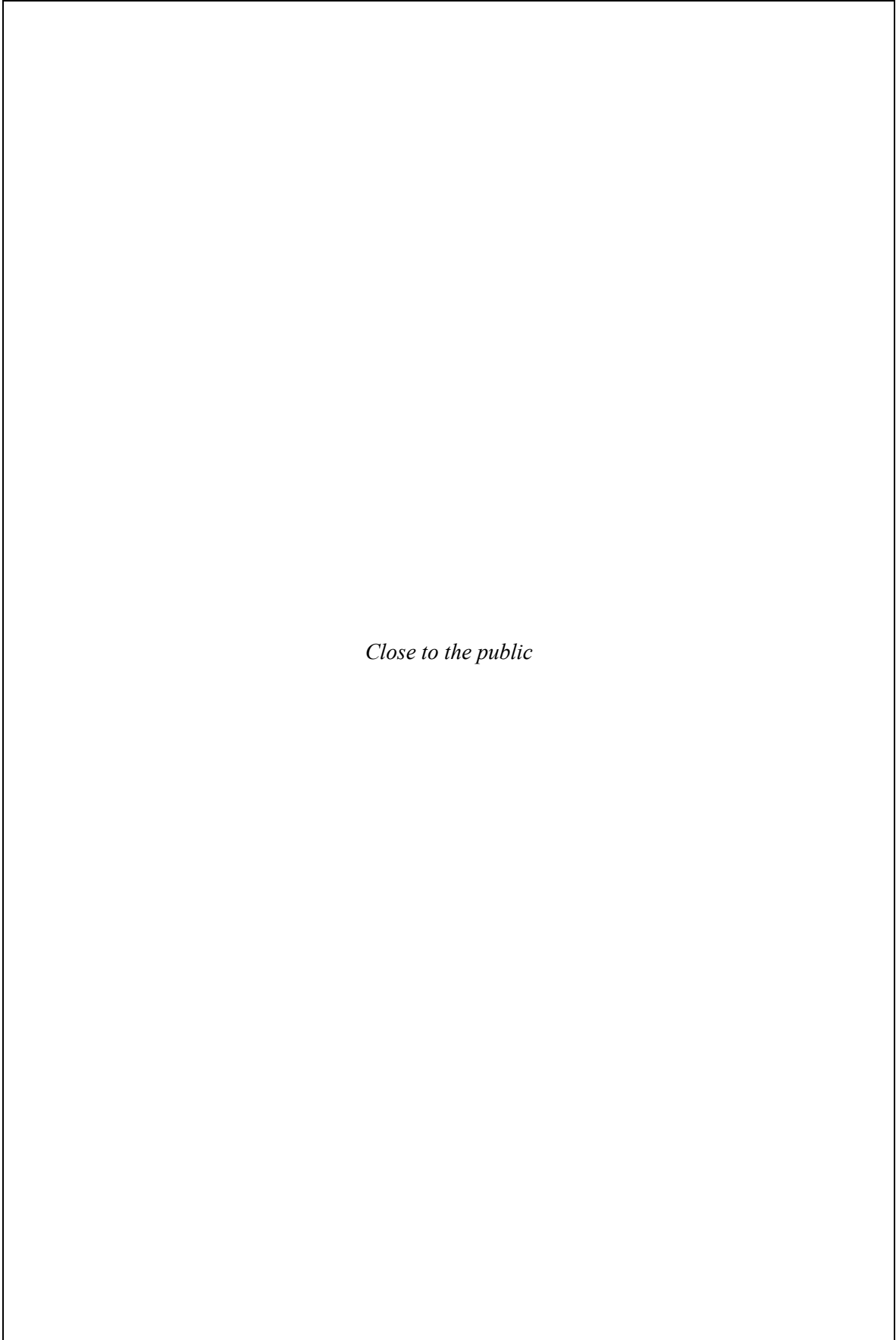
No.	Project Name	Site Location	Japanese Implementer	Summary (Relevant words are shown in bold letters.)	Relevant Section
	Management using Michibiki, a Japanese Quasi-Zenith Satellite System		<u><i>Ltd.</i></u> , and <u><i>Hitachi Solutions, Ltd.</i></u>	(DEM) , and these data are used to estimate the height of eucalyptus trees on plantation sites. Source: https://www.hitachi.co.jp/New/cnews/month/2019/09/0913.html	
4	Agriculture Support Cloud Service, “Up-a-ray”	Japan	<u><i>Kokusai Kogyo Co., Ltd.</i></u>	Satellite RS and drone images are used for analysis of the plant protein content and dryness of plants. This allows farmers to identify fields that are dominated by weeds and require immediate reseeding. The information obtained from the analysis is also sent to smartphones.	6.1.1. (1) 6.1.1. (4)

This table shows only a part of referenced Japanese domestic case examples. More case examples relevant to the Project can be found elsewhere.

Annexure 6.2: Indicative List of Drone Schools with Relevant Training Courses including Data Post-Processing in Japan

Close to the public

Annexure 6.3: Qualifications and Roles and Responsibilities of GIS/MIS Specialists



Close to the public

Annexure 6.4: Roles and Responsibilities of GIS and MIS-Related Members in PMU

Close to the public

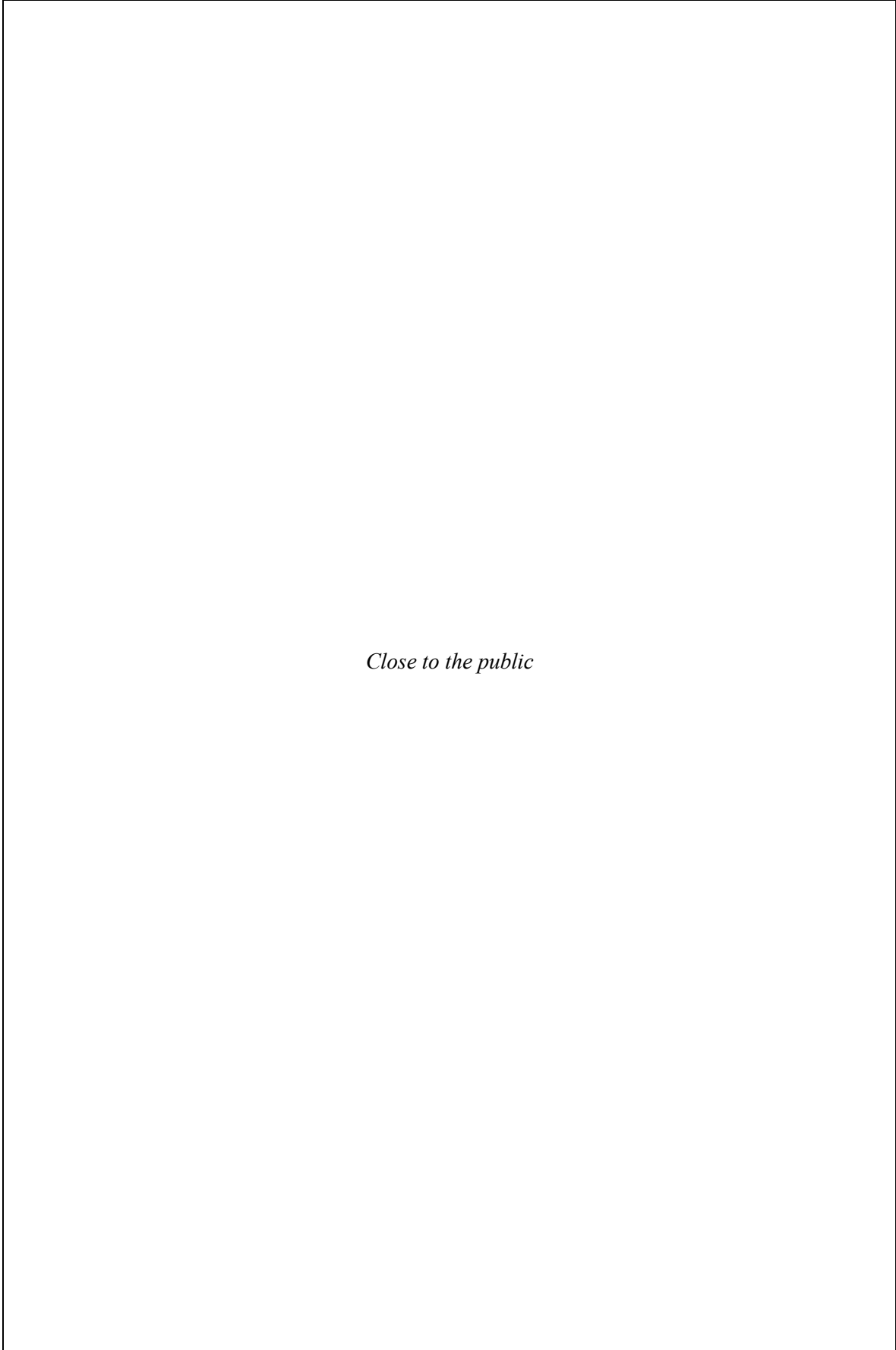
Annexure 6.5: Indicative TOR for Remote Sensing Analysis for Habitat Mapping

Close to the public

Close to the public

Close to the public

Annexure 6.6: Indicative TOR for the Inbound Server Development Work



Close to the public

Close to the public

Annexure 6.7: Indicative TOR for Drone-Based Survey and Data Post-Processing

Close to the public

Close to the public

Close to the public

Annexure 6.8: Detailed Implementation Plan for GIS and MIS

Activity	2020		2021		2022		2023		2024		2025		2026		2027		Month
	Jan	Feb	Jan	Feb	Jan	Feb	Jan	Feb	Jan	Feb	Jan	Feb	Jan	Feb	Jan	Feb	
6.1 GIS and MIS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.1.1 Introduction of Geospatial Technology	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.1.1 (1) Habitat Mapping	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.1.2 (1) Procurement and Preprocessing of Satellite Imagery	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
6.1.2 (1)2) Ground Truthing	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	3
6.1.2 (1)3) Classification	4	4	12	12	4	4	4	4	4	4	4	4	4	4	4	4	32
6.1.2 (1)4) Accuracy Assessment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
6.1.2 (1)5) Suitability Analysis	0	0	2	2	0	0	2	2	0	0	0	0	0	0	0	0	4
6.1.1 (2) Cloud-Based Data Management and Monitoring	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.1.1 (2)1) Registration of Google Cloud Services	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
6.1.1 (2)2) Import data for analysis (satellite imagery and statistical data)	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
6.1.1 (2)3) Develop and run data processing programs	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
6.1.1 (2)4) Server equipment procurement and setting up for Server for Data Conversion	2	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	4
6.1.1 (2)5) Download analysis results data to SDC servers	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	2
6.1.1 (2)6) Maintenance and Support	0	0	10	10	2	2	2	2	2	2	2	2	2	2	2	2	24
6.1.1 (3) Prioritization of Target Mangrove Plantation Areas	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.1.1 (3)1) Preparation of Satellite Imagery	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
6.1.1 (3)2) Automatic Classification	5	5	3	3	1	1	1	1	1	1	1	1	1	1	1	1	7
6.1.1 (3)3) Manual Interpretation	0	0	8	8	0	0	0	0	0	0	0	0	0	0	0	0	8
6.1.1 (3)4) Buffer Analysis	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
6.1.1 (3)5) Physical Verification	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1
6.1.1 (4) Drone-Based Plantation Monitoring	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.1.1 (4)1) Outsourcing Company Selection	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
6.1.1 (4)2) Registration	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
6.1.1 (4)3) Drone-Based Monitoring	0	0	2	2	8	8	8	8	8	8	8	8	8	8	8	8	46
6.1.1 (4)4) Standard Operating Procedures (SOP)	0	0	1	1	2	2	2	2	2	2	2	2	2	2	2	2	12
6.1.2 GIS/MIS Enhancement	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.1.2 (1) Equipment Procurement	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
6.1.2 (2) Expansion of Geoforest Operation	3	3	6	6	0	0	0	0	0	0	0	0	0	0	0	0	9
6.1.2 (3) Development of New GIS Modules for eGeoforest	3	3	12	12	7	7	7	7	7	7	7	7	7	7	7	7	22
6.1.3 Capacity Development	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.1.3 (1) Preliminary Needs Analysis	0	0	5	5	1	1	1	1	1	1	1	1	1	1	1	1	5
6.1.3 (2) Overseas Training/Exposure Visits	0	0	7	7	12	12	5	5	5	5	5	5	5	5	5	5	24
6.1.3 (3) Domestic Training in Gujarat	0	0	0	0	0	0	7	7	12	12	6	6	6	6	6	6	37

Source: JICA Study Team (2019)

Annexure 6.9: Draft Manual for Green CSR

(1) Introduction

The effort to tackle the impacts of climate change continues; progress has been staggering. Further, India has submitted the Intended National Determined Contribution (INDC) to the UNFCCC, committing to eight points, including the creation of a carbon sink equivalent to 2.5 to 3 billion tonnes by 2030 through the enhancement of forest and tree cover. Part of the contribution is made under the Green India Mission, which was launched in 2014 in order to improve forest management in India and thus to mitigate impacts resulting from climate change. It has targeted the enhancement of forest and tree cover up to 5 million hectares and the improvement of the quality of forest and non-forest land of another 5 million ha, to be achieved in 10 years. In cases where the forest land is converted to other land use for development, the Compensatory Afforestation Fund Management and Planning Authority (CAMPA) guides the compensatory afforestation. As a result, India's forest cover is slowly improving, and the same is true for the state of Gujarat. However, there is still a lot more to be done to achieve the goal, and resources seem insufficient¹.

On the other hand, as the society as a whole becomes more aware and conscious of sustainability, the corporate houses are expected to make their business conduct more sustainable and ethical. How the corporates deal with sustainability is now rated as known as Environment Social and Governance perspective (ESG rating) and affect their corporate value in the global market. Thus, corporates cannot only pursue profit without taking care of the sustainability issues. Environment, of which forest is a part, is an area that the corporates can contribute.

Since Gujarat is home to many corporate houses, opportunity for corporate funded afforestation exists. Under the Companies Act 2013, corporate houses of a certain level of value need to spend a set amount of their profits to contribute to the betterment of society. So far, most of the CSR funding in Gujarat goes to education, sanitation, and livelihoods. The forest and environment sector has yet to gain attention. This is partly due to the lack of promotion and facilitation efforts made by the concerned organizations. However, as has been seen in the Maharashtra Forest Department, CSR fund of the corporate houses can be utilized to further advance forest cover.

To the Gujarat Ecosystem Management Project with a mandate to improve and conserve the diverse ecosystem of the state intends to promote corporate engagement in the afforestation by extending its expertise in sustainable forest management.

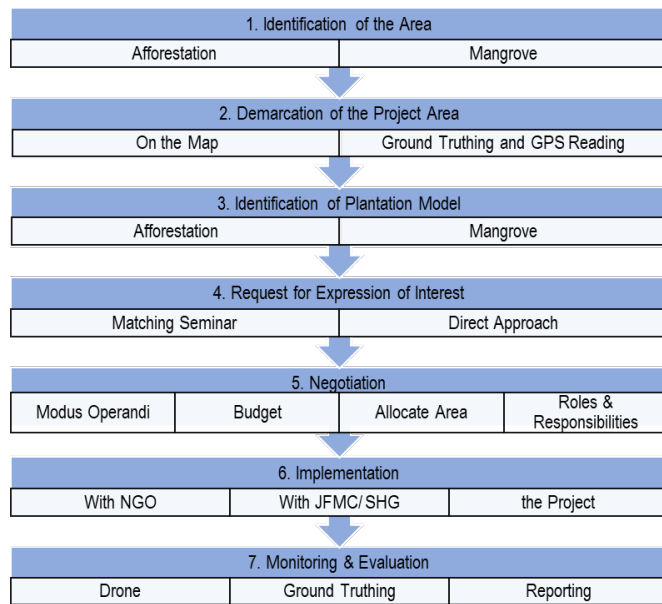
(2) Objectives of the Manual

This manual provides a step wise description of planning, implementation and M&E of afforestation projects through CSR/Private Partnership to be used by the concerned project officer. The overall framework will follow the guidelines on afforestation through private sector engagement as issued by the Ministry of Environment, Forest and Climate Change (Forest Conservation Division) vide F. No. 5-2/2017-FC dated August 26, 2019.

¹ <https://www.downtoearth.org.in/news/forests/green-india-mission-grossly-underfunded-parliament-panel-63291>

(3) Overall Implementation Framework of Green CSR/ Private Partnership Sub-Component

The overall implementation framework of the Green CSR/Private Partnership sub-component is given in the figure to the right. The planning process is comprised of seven steps. In this scheme, the implementation agency will be JFMCs/EDCs/SHGs under the technical supervision of the Project. If there are no JFMCs/EDCs/SHGs found in the area, local CBOs can be engaged for the work. In both cases, a tripartite agreement will be exchanged between the corporate houses, JFMCs/EDCs/SHGs/CBOs, and the Project. The PMU officer in charge will work closely with the respective circle, division and range-level project implementation units established under the PMU in identifying the Green CSR project area including demarcation and identifying the applicable plantation model. In the implementation stage, technical guidance and monitoring will be undertaken jointly by the range-level project implementation and PMU officer in charge. The plantation materials will also be procured from the GFD nurseries. Reporting will be done mainly by the PMU officer in charge of the Green CSR/Private Partnership.



Source: JICA Study Team (2019)

Figure 1: Implementation Process of Green CSR/ Private Partnership Projects

(4) Planning

1) Identification of the Area

The implementation begins with the identification of the area for afforestation. The process will be initiated by the PMU officer in charge of Green CSR/Private Partnership in consultation with the respective circle, division and range-level project implementation units. Field-level consultations with the potential field-level implementation unit (JFMC/EDC/SHG/CBOs) will be carried out with guidance provided by PMU officer in charge and the concerned divisions and ranges. The suggested criteria for identification of the site are as below.

- Crown density below 40% and natural regeneration is not possible
- Minimum of 50 ha of geographically contiguous forest land
- Within the Project districts
- Rights over forest resources in the potential sites, communities affected and mitigation measures
- Easily accessible to the public and JFMC/EDC/SHG/CBO
- Consensus by the JFMC/EDC/SHG/CBO members and other local stakeholders (i.e. Gram Panchayat Sarpanch, sub-committee of Gram Panchayats, Biodiversity Management Committee, ward members etc.)

In case geographically contiguous forest land cannot be identified for the intervention, revenue forest can also be considered. District wise open forest area is given in the table below and the potential Project districts are indicated in bold. Districts having more than 70% of the recorded forest are marked with “x” in the table below and can be considered as priority districts for the Green CSR project interventions. Since the corporates are likely to invest in areas to which they are closely

associated (i.e. operational area, facilities established, where employees come from, etc.), a few districts may be shortlisted.

Table 1: District Wise Recorded Forest Areas by Density Class

Sl. No.	District	Geographical Area in km ²	Very Dense Forest in km ²	Moderate Dense Forest in km ²	Open Forest in km ²	Total of Forest Land	% of Open Forest to the Total of Forest Land	Districts with More than 70% of the Open Forest*
1	Ahmedabad	8,107	0	12	117	129	90.7	X
2	Amreli	7,397	0	63	188	251	74.9	X
3	Anand	3,204	0	18	45	63	71.4	X
4	Banaskantha	10,743	0	372	476	848	56.1	
5	Bharuch	6,509	0	71	243	314	77.4	X
6	Bhavnagar	10,034	0	47	230	277	83.0	X
7	Dahod	3,642	1	118	419	538	77.9	X
8	Gandhinagar	2,140	0	11	81	92	88.0	
9	Jamnagar	14,184	0	55	380	435	87.4	
10	Junagadh	8,831	15	956	663	1,634	40.6	
11	Kachchh	45,674	0	301	2,011	2,312	87.0	
12	Kheda	3,953	0	20	74	94	78.7	X
13	Mehsana	4,401	0	13	146	159	91.8	X
14	Narmada	2,817	20	464	479	963	49.7	
15	Navsari	2,246	18	125	159	302	52.6	
16	Panchmahals	5,231	0	219	518	737	70.3	X
17	Patan	5,792	0	1	101	102	99.0	
18	Porbandar	2,316	0	16	108	124	87.1	
19	Rajkot	11,198	0	3	138	141	97.9	
20	Sabarkantha	7,394	29	304	474	807	58.7	
21	Surat	4,549	5	294	216	515	41.9	
22	Surendranagar	10,423	0	6	169	175	96.6	
23	Tapi	3,139	80	479	251	810	31.0	
24	Dangs	1,766	210	743	415	1,368	30.3	
25	Vadodara	7,546	0	145	484	629	76.9	X
26	Valsad	3,008	0	344	594	938	63.3	
	Total	196,244	378	5,200	9,179	14,757	62.2	

* X: indicates district with high potential for Green CSR project.

Source: India State of Forest 2017, Forest Survey of India.

The mangrove cover of the state has increased more than 200% over the period between 1987 and 2017. However, what we know from the statistics is that the 84.9% of the mangrove area is still open area. Although plantation efforts lead to valuable increments in the mangrove area, it still requires substantial efforts to achieve a healthy mangrove ecosystem. The districts may be selected from the areas where many corporates are located along the coastal belt. Regeneration on revenue land may also be considered for this activity. As for mangrove rehabilitation, projects may also be implemented in collaboration with the GEC.

Table 2: District Wise Mangrove Area by Density Class

Sl. No	District	Very Dense Mangrove in km ²	Moderate Mangrove in km ²	Open Mangrove in km ²	Total in km ²	% of Open Mangrove to the Total
1	Ahmedabad	0	1	31	32	96.9

Sl. No	District	Very Dense Mangrove in km ²	Moderate Mangrove in km ²	Open Mangrove in km ²	Total in km ²	% of Open Mangrove to the Total
2	Amreli	0	0	2	2	100.0
3	Anand	0	0	8	8	100.0
4	Bharuch	0	14	31	45	68.9
5	Bhavnagar	0	6	16	22	72.7
6	Jamnagar	0	28	156	184	84.8
7	Junagadh	0	0	3	3	100.0
8	Kachchh	0	118	680	798	85.2
9	Navsari	0	0	14	14	100.0
10	Porbandar	0	0	1	1	100.0
11	Rajkot	0	1	3	4	75.0
12	Surat	0	4	17	21	81.0
13	Vadodara	0	0	3	3	100.0
14	Valsad	0	0	3	3	100.0
	Total	0	172	968	1,140	84.9

Source: India State of Forest 2017, Forest Survey of India.

2) Formulation of Five-Year Action Plan and Annual Work Plan for Green CSR/Private Partnership for Afforestation

The Project will identify the area suitable for CSR/Private Partnership-based afforestation activities. The area should be geographically contiguous and large enough to be worked upon for five years. The total land area shall be demarcated on the map and ground truthing should also be conducted by the PMU officer in charge and the concerned forest guard to record the GPS coordinates. This exercise will be carried out jointly by the PMU officer in charge and the division and range-level Project implementation units. During the planning exercise, following points shall be deliberated upon. While discussing the following points, “Greening of Maharashtra” (pp 9 – 11), produced by the Maharashtra Forest Department, may be referred to.

- Tripartite agreement template
- Rights of implementation units (JFMC/EDC/SHG/CBO) over the forest resources (i.e. grass, fuelwood, medicinal plants, etc.) in the Green CSR plantation sites
- Benchmark survival rate²
- Consensus on the roles and responsibilities of GFD (circle, division, and range)
- Non-performing JFMC/EDC/SHG/CBO
- Cases in which the plantation is affected by natural calamity
- Cancellation of the contract when the survival rate does not reach the benchmark survival rate set by the Project

The Five-Year Plan can be prepared separately for afforestation and mangrove plantation by the PMU officer in charge in close consultation with the respective circle, division and range-level project implementation units. Depending on the identified landscape, a plantation model can be identified by the Project. The annual target for plantation can also be prepared along with the cost of plantation as per the schedule of rates. The initial two years shall be taken as a pilot phase and thus the Project should attempt to complete 15% of the total area during the first and second years of implementation, while 20% of the total area should be allotted for the third and fourth years, and 30% of the area for the fifth year. The prepared strategy and plans shall be submitted to the PMU executive committee and thereafter submitted to the Governing Body for approval.

An Annual Work Plan will be prepared by the PMU officer in charge in close consultation with the respective circle, division and range-level project implementation units at the end of the previous

² In the case of Maharashtra Forest Department, 50% survival rate after three years was set as a benchmark. When the survival rate is not met, the tripartite agreement is to be cancelled. (Greening of Maharashtra. P 11)

financial year to be approved by the Governing Body of the Project.

The budget for the Five-Year Plan should be prepared as per the schedule of rates of the GFD and other costs shall be based on prevailing market rates.

3) Preparation of Green CSR/Private Partnership Project Proposals for Corporates

When mobilising private resources, the Project shall initiate the process of interaction. A project proposal document will provide a basis for effective communication between the stakeholders. The project proposals for corporates shall be prepared by the PMU officer in charge of the the Green CSR projects based on the Annual Work Plan. The proposal should contain a description of the project area, what plantation model should be adopted, mode of execution, M&E, reporting, and the budget. The area can be divided into patches of manageable size so that, depending on the budget available with the corporates, the number of patches can be allocated to the interested corporates.

The budget should be calculated according to the schedule of rates of the GFD and prevailing market rates. It should also include two years of maintenance costs, and 15% of the institutional charge. Of which, 70% of the institutional charge will be given to the JFMC/EDC/SHG/CBO as to cover administrative expenses as well as to be utilised for community development. The institutional charges will be disbursed to the JFMC/EDC/SHG/CBO as per the survival rate of the trees.

The duration of each project will be three years, comprised of plantation work (first year), and maintenance/gap filling in the second and third years. The booking for CSR investment is to be done by the end of each financial year so that advanced booking can be done. Bookings and donations can also be made throughout the year, and the seminar held by the Green CSR/Private Partnership Unit can be held at various locations twice a year.

Table 3: Indicative Roles and Responsibilities of Each Party

Concerned Actor	Roles and Responsibilities
Private Partner	<ul style="list-style-type: none"> • Providing Funds • Publicizing Green CSR Interventions by the Project and promoting plantation activities by the corporates
PMU	<ul style="list-style-type: none"> • Signer of the tripartite agreement • Overall technical and managerial supervision and monitoring • Supervision of management of the financial transactions concerning Green CSR projects and CSR fund
Circle	<ul style="list-style-type: none"> • Overall technical and managerial supervision and monitoring • Supervision of the financial transactions concerning Green CSR projects and CSR fund
Forest Divisions	<ul style="list-style-type: none"> • Overall execution of the tripartite agreement • Planning • Identifying corporate partners and implementing organization (JFMC/EDC/SHG/CBO) • Technical supervision of the implementing organization (JFMC/EDC/SHG/CBO) • Providing quality saplings • Site verification • Monitoring (physical and financial)
Range/ Concerned Forest Guard	<ul style="list-style-type: none"> • Taking coordinates of the plantation sites • Guiding JFMC/EDC/SHG/CBO members for procurement of the materials, undertaking the plantation works, and watch and ward • Site verification • Regular monitoring (physical and financial)
PMU Officer in Charge	<ul style="list-style-type: none"> • Planning • Identifying corporate partners and implementing organization (JFMC/EDC/SHG/CBO)

Concerned Actor	Roles and Responsibilities
	<ul style="list-style-type: none"> • Monitoring (physical and financial) • Reporting • Management of Green CSR fund including developing operational manual for the fund
JFMC/EDC/SHG/CBO	<ul style="list-style-type: none"> • Taking part in site identification • Consensus building among villagers to take part in the Green CSR project • Taking part in the selection of the trees to be planted • Mobilization of laborers • Procurement of planting materials • Undertaking afforestation work as per the technical guidance of the Project • Watch and Ward • Record keeping (i.e. financial records, plantation registers)

Source: JICA Study Team (2019)

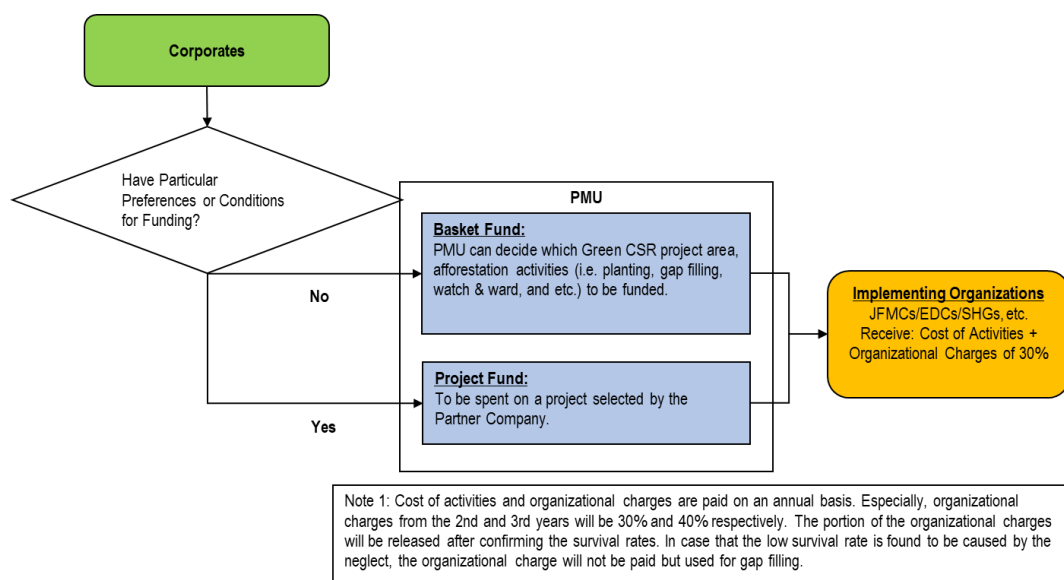
Table 4: Indicative Main Cost Component for Green CSR/PP Project

(a) Cost of Saplings and other planting materials
(b) Wages
(c) Cost of transporting the saplings
(d) Maintenance cost for 2 years
(e) Watch and ward
(f) Organizational Charge of 15% of the total of (a) – (e)

Source: JICA Study Team (2019)

The organizational charge of 15% will be shared between the Green CSR/Private Partnership unit and the implementing agency of JFMC/EDC/SHG/CBO at the rate of 30:70. The community organizations will receive 70% of the organizational charge, and this can be used for community development as per the collective decision taken at the General Body of the JFMC/EDC/SHG/CBO. The 30% of the charge will be retained by the PMU in a separate account to be used when the maintenance/gap filling budget is not sufficient and for the maintenance after the completion of the financing period.

Fund flow is given in the figure below. The Green CSR funds are received from the corporate partners for a particular plantation site, and the funds will be directly transferred from the PMU to the implementing JFMC/EDC/SHG/CBO's bank account. Disbursement will be done in instalment. The first disbursement will be for the cost of the saplings and wages, and 30% of the organizational charge of their share. In the second and third years, the maintenance costs and organizational charge will be transferred to the accounts of JFMC/EDC/SHG/CBO's bank account after confirming the survival rate set by the project each year. However, to prevent malfunctioning of JFMC/EDC/SHG/CBO or low survival rate, regular monitoring and guidance by the concerned forest guard, the concerned project division and the officer in charge in PMU will be carried out.



Source: JICA Study Team (2019)

Figure 2: Fund Flow of Green CSR/Private Partnership Project

4) Identification of Corporate Partners and Mobilization of Resources

a. Holding Green CSR/Partnership Seminars

The Project will organize seminars in Ahmedabad and Surat to identify corporate partners. The indicative seminar program is given in the table below.

Table 5: Indicative Outline of the Green CSR/Partnership Seminar

Particulars	Description
Venue	Ahmedabad, Surat, Vadodara
Frequency	Once in every six months
No of participants	100 persons (CSR persons in the corporate houses, NGOs, local government officers, etc.)
Programme	Sharing of the details of the Project (objectives, Project area, implementation, funding options, etc.) Response from the corporates Sharing of experience by the JFMC/EDC/SHG/CBO (the second year onwards)

Source: JICA Study Team (2019)

b. Establishing Web-Based Gateway for Raising Fund for Green CSR/Private Partnership

With the intention of effectively interacting with the corporates, a gateway will be established as part of the Project web-site. This gateway should have the investable project proposals prepared by the officer in charge in PMU and should also receive proposals from the corporates. In addition, it should provide free guidance to those corporates that are interested in investing or require technical guidance for forest ecosystem management. It should also provide an option to receive donations as seen in websites such as Swachh Bharat Kosh and Nature Club (in Surat). The maintenance of the gateway shall be done by the M&E/MIS section of the Project.

5) Signing of Tripartite Agreement

A tripartite agreement needs to be exchanged between the private partners, the Project and JFMC/EDC/SHG/CBO engaged for the afforestation activities. Both the existing and newly organized JFMC/EDC/SHG/CBO can be considered as implementing body of the Green CSR project. The agreement should specify the roles and responsibilities of each party, allotted areas of

afforestation, work specification, and financial details, among other matters. There should also be a clear statement that the private sector partners will not have rights over the trees planted and the fruits on the trees, as well as the land where the afforestation work is done. The draft will be prepared by the officer in charge of Green CSR in PMU and reviewed and approved by the Executive Committee of the PMU and Governing Body of the Project.

6) Implementation of Afforestation Activities

Once the tripartite agreement is signed by all concerned parties, the afforestation work will be undertaken by JFMC/EDC/SHG/CBO under the technical guidance of the concerned forest division, range and the forest guard of the respective areas. The required saplings shall be procured from the GFD nursery.

(5) M&E

1) Establishment of CSR Monitoring - Web-Based Platform

PMU officer in charge of Green CSR will undertake monitoring and evaluation of the projects in coordination with the PMU M&E/MIS section and concerned division and range. As each of the Green CSR/Private Partnership projects will have its own unique monitoring indicators, having a web-based platform would enable timely monitoring by the PMU and facilitate the reporting process. All of the CSR project sites shall be geo-coded.

Drones will be used to take the images of the project sites on a quarterly basis. These images will be made available on the website for each sponsoring company along with the description of the areas and synopses of site observations.

2) M&E Data Collection

Monitoring of the Green CSR project will be undertaken at each site while the fund is received by a corporate. Once the financing period is completed, the plantation site will be monitored under the project monitoring system and looked after by the JFMC/EDC/SHG/CBO that implemented the works and the concerned forest guard. Photo records of the site can be taken twice a year and uploaded on the project website.

Monitoring Indicators will be comprised of two indicator groups. One type of indicator concerns with the plantation and the other concerns with the finances and performance of JFMC/EDC/SHG/CBO. Indicative monitoring indicators are given in the table below.

Table 6: Indicative Monitoring Indicators for CSR Afforestation Projects

Indicator Type	Indicators	Means of Verification	Person in Charge	Timing
CSR Project Indicators	<ul style="list-style-type: none"> • Number of companies invested • Areas covered by each company • Number of JFMC/EDC/SHG/CBO engaged 	Tripartite Agreement Signed	PMU	Quarterly
	<ul style="list-style-type: none"> • Number of workers engaged (gender segregated) • Amount spent on wages 	Muster roll kept at the JFMC/EDC/SHG/CBO	Division/Range (Forest Guard)	Monthly
	<ul style="list-style-type: none"> • Amount spent on materials 	Account book maintained by JFMC/EDC/SHG/CBO		Monthly

Indicator Type	Indicators	Means of Verification	Person in Charge	Timing
	<ul style="list-style-type: none"> • Number of saplings procured • Number of saplings planted • Number of saplings survived 	Plantation Register kept by the forest guard/JFMC/EDC/SHGs	Division/Range (Forest Guard)	Monthly
Plantation Monitoring Indicators	<ul style="list-style-type: none"> • As per the M&E indicator of the GFD 	As per the record kept under the M&E system of the GFD	Division/Range (Forest Guard)	As per the GFD M&E guidelines

Source: JICA Study Team (2019)

The site-based technical guidance and the field record will be kept on paper by the concerned forest guard. The recorded data will be forwarded from the concerned range to the division. The division will upload the data onto the web-based Green CSR monitoring system. At least in every quarter, the concerned officer from the division and circle will visit the site and provide managerial and technical follow up. Annual site visits shall also be organized by the Project for the contributing corporate houses. During these site visits, concerned divisional and range-level project officer or staff shall accompany.

The Project also welcomes site visits by corporates that are interested in hosting one.

3) Reporting to the Funding Corporates

The monitoring report generated from the MIS system will be made available on the web, where the corporates can also access it as required. The monthly progress report will also be sent to the private partners via e-mail. In case a printed version is required, the Project will provide one upon request. The reporting to the corporates will continue for the duration of the particular project financed by them.

4) Networking

Networking would be undertaken primarily by the officer in charge in PMU. The association of industries and cooperates within and outside of the state (i.e. FICCI, CII, JETRO, etc.) can be contacted to build a network, through which the Project may identify potential collaborators, and also to generate project ideas. Participation in a national and state CSR summit shall also be an annual activity. In addition, local (mostly district level) stakeholders may be invited twice a year to have the Green CSR/Private Partnership project proposals shared with them. The PMU officer in charge will also attend the district level meetings held by the projects for the purpose of networking with the local stakeholders.

5) Publicity/Documentation

The corporates require proper reporting by the Project. The reporting should be concise and easy to read, yet capture the key aspects of the interventions. Success stories can also be documented for the benefit of the Project, as well as for the corporates. Competent private agencies may also be engaged if there is a need to produce such things as videos or publications. The reports will be prepared by the PMU officer in charge of Green CSR.

6) Evaluation of the Five-Year Plan

In the fifth year of the Project, the PMU will assess the Project achievements and take a decision on whether to continue or not. If the activities are to be continued, the second Five-Year Plan should be developed following the process adopted in creating the first Five-Year Plan.

7) Green CSR Project Evaluation and Impact Assessment

The overall project will have the midterm project evaluation, end of project evaluation at the end of the project and impact assessment in the post project period. As part of this exercise, the achievements and impacts of Green CSR project shall be assessed. The cost shall be estimated as part of the overall project Evaluation and Impact Assessment component.

(6) Institutional Arrangement for Green CSR/Private Partnership

Within the PMU of the Project, an officer will be made in charge of Green CSR projects. The officer will plan and monitor Green CSR projects and will coordinate with the concerned circle, divisions, ranges, community level implementation units and funding corporates. The field level implementation will be undertaken by JFMC/EDC/SHG/CBO or any other community organization with the technical guidance of the forest guard in the concerned range. The concerned forest guard also monitors progress on a regular basis.

In case resource organizations are required to assist the community-level implementing organization, they can be engaged as required. The procurement of such organizations shall be undertaken by the PMU following the standard procurement procedures. Collaboration with the GEC on mangrove regeneration activities may be sought.

(7) Financial Management for CSR/Private Partnership

The PMU, as a registered society under the Societies Registration Act 1860, shall have a clause in its by-laws on the management of the CSR fund. Registration with the Income Tax Department for applicable tax exemption for the PMU (Income Tax Act Section 12AA) and for the entities making donations towards Green CSR (Income Tax Act Section 10 (23c)) should also be done during the formation stage of the PMU. A separate account will be kept for the CSR/Private Partnership by the Finance Officer in the PMU. When establishing the PMU, the financial management for CSR/Private Partnership shall be further examined by receiving expert advice from a Chartered Accountant. This shall be documented in the Operation Manual of the PMU.

Fund flow of the Green CSR Projects will follow the overall financial management system of the PMU.

END

Annexure 6.10: Detailed Implementation Plan for CSR/Private Partnership for Afforestation Component

Activity	2020		2021		2022		2023		2024		2025		2026		2027		Year 8		Year 9		Month	
	Q1	Q2	Q1	Q2	Q1	Q2	Q1	Q2	Q1	Q2	Q1	Q2	Q1	Q2	Q1	Q2	Q1	Q2	Q1	Q2		Q1
6.2.6 (1.1) Establishment of Green CSR/PP Unit	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.2.6 (1.2) Preparation of Manual for Afforestation under CSR/PP (Plan for Future)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.2.6 (2.2) Identification of the Area	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.2.6 (2.3) Formulation of Five-Year Plan and Annual Work Plan for Green CSR/PP (Plan for Future)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.2.6 (2.4) Identification of Component Partners and Mobilisation of Resources	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.2.6 (2.5) Signing of Tripartite Agreement	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.2.6 (2.6) Implementation of Afforestation Activities	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.2.6 (3.1) Establishment of Green CSR Monitoring Platform	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.2.6 (3.2) MRE Data Collection	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.2.6 (3.3) Reporting to the Funding Corporates	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.2.6 (3.4) Networking	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.2.6 (3.5) Publicity/ Documentation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.2.6 (3.6) Evaluation of the Five-Year Plan and Performance of Green CSR/PP Unit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.2.6 (3.7) Green CSR Project Evaluation and Impact Assessment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Source: JICA Study Team (2019)

Annexure 6.11: List of Farmer Producer Organizations and Clusters

1) List of Farmer Producer Organizations in Gujarat under Small Farmers' Agri-Business Consortium

Sl. No	Name of the FPO	Address	Commodity	Resource Organisations
1	Adivasi Khet Vikas Sangathan Producer Company Ltd.	Sr. No. 127/128, Reva Ginning & Pressing Factory, Behind Naswadi Railway Station, Kawant Road, Naswadi, Tal : Naswadi, Dist :	Cotton, Tur, Maize	Cohesion Foundation Trust
2	Kankrej Kisan Producer Company Ltd.	H2880, Bhakti Nagar, Near Ganesh Steel Corporation, Thara, Tal : Kankrej, Dist : Banaskantha, Gujarat	Castor, Cotton, Wheat, Bajara, Pulses	Cohesion Foundation Trust
3	Vadhiyar Kisan Producer Company Ltd.	Varahi, 21 Makan Chali, Railway Station Road, Thara Raod, Po : Santalpur Tal : Patan, Dist : Patan, Gujarat	Castor Seed, Cotton, Guar Seed	Cohesion Foundation Trust
4	Vagad Kisan Producer Company Ltd.	1st Floor, Sindhyachal Building, Near NJ Hospital, Rapar Block, Opp. Vikasvadi, Ayodhyapuri, Rapar, Tal : Rapar, Dist : Kachchh, Gujarat	Castor Seed, Guar Seed, Cumin Seed	Cohesion Foundation Trust
5	Shri Munikripa Vegetable Producer Company Ltd.	32 Fakir Andeg, Andeg, Tal : Sanand, District : Ahmedabad, Gujarat	Tomato, Bitter Gourd, Brinjal	Development Support Centre
6	Bhal Pradesh Vividh Khet Utpadak Ane Vechan Sahakari Mandali Ltd.	Post-Frdra Near Shankar Temple, Tal : Dhandhuka, District : Ahemdabad, Gujarat.	Gram, Cumin Seed, Wheat	Development Support Centre
7	Dahod Gramin Adivasi Vikas Producer Company Ltd.	Kanchan Kunj Society, Anand Bhavan, Chakalya Road, Dahod, Tal & Dist : Dahod, Gujarat.	green Gram, Black Gram	Gramin Vikas Trust
8	Netrang Pulse Crop Producer Company Ltd.	C/o Anujibhai Bhikhji Bhai Vasava 3, Vadkhunta. Post : Vadkhunta, Tal : Jhagadia, Dist : Bharuch, Gujarat.	Pegion Peas, Green Gram, Black Gram, Cotton	Aga Khan Rural Support Programme
9	Quality Vegetables Farmers Producer Company Ltd.	P.O. Gitapur, Chandanmukhi line, Bhagpura, Rampura, Ahemdabad382140, Gujarat.	NA	International Traceability System Ltd.
10	Kheda Farmers Vegetables Producer Company Ltd.	Village amsaran, mehmedabar387335,Gujarat	NA	International Traceability System Ltd.
11	Ekta Farmer Producer Cooperative	Post Kuha Block- Dascroi, Dist. Ahmedabad, Gujrat	Paddy, Wheat, caster, Brinjal, Laides Finger	Development Support Centre
12	Surydeep Adivasi Pulse Producer Company Ltd.	35, Mukhya Faliyu, Galiba, Jagadiya- 393130, Bharuch Gujarat	Pegion Peas, Green Gram, Black Gram, Cotton	Aga Khan Rural Support Programme
13	Bhumiputra Pulse Crop Producer Company Ltd.	Patdi, Ta. Dediapada, Narmada- 393041	Pegion Peas, Green Gram, Black Gram, Cotton	Aga Khan Rural Support Programme
14	Lilotri Pulse Producer Company Ltd.	Avlikund, Tal. Sagbara, Narmada, Narmada, Gujarat, India, 39302	Pigeon Peas, Green Gram, Black Gram, Cotton	Aga Khan Rural Support Programme
15	Umarpada Pulse Crop Producer Company Ltd.	Chimipatal, Umarpada, Surat, Surat- 394445, Gujarat	Pigeon Peas, Green Gram, Black Gram, Cotton	Aga Khan Rural Support Programme
16	Dangi Adivasi Mahila Khedut Utpadak Producer Company Ltd.	Aga Khan Rural Development Program (Movi Road, Netrang, Bharuch, Gujarat, 393130)	Pigeon Peas, Green Gram, Black Gram, Cotton	Aga Khan Rural Support Programme
17	Limkheda Adivasi Khedut Vikas Producer Company Ltd.	Village Bar, Taluka Limkheda, Dahod- 389140, Gujarat	Channa, Paddy, Wheat, Tur, Soya bean	Gramin Vikas Trust
18	Jhalod Ekta Producer Company Ltd.	Kalimahudi, Karath, Ta. Zalod, Jhalod, Dohad- 389180, Gujarat	Channa, Paddy, Wheat, Tur, Soya bean	Gramin Vikas Trust
19	Morva Hadaf Kheti Vikas Producer Company Ltd.	Village- Kadadra, Morva Hadaf, Panch Mahals- 389115, Gujarat,	Channa, Paddy, Wheat, Tur, Soya bean	Gramin Vikas Trust
20	Godhra Khedut Vikas Producer Company Ltd.	Chhariya, Taluk- Godhra, Village: Chhariya, District: Panchmahal, Godhra, Panchmahals- 389001 , Gujarat	Channa, Paddy, Wheat, Tur, Soya bean	Gramin Vikas Trust
21	Fasal Vikas Producer company Ltd.	Kantu Ambakhakar Fly, Ghoghamba, Panchmahals- 389380, Gujarat	Maize, Paddy, Tur, Ground Nut, Gram, What	Gramin Vikas Trust

Source: <http://sfacindia.com/Aboutus.aspx>

2) Clusters Promoted by MART under GFDP II

<p><i>Close to the public</i></p>

Annexure 6.12: List of Organic Manufacturers and Merchants and Potential Partner Companies

1) Herbs and Medicinal Plants

Sl. No	Name of Manufacturer cum Merchant	Address	City	Contact Person	Pincode	Mobile No	E-mail	Phone	Fax
1	Agricultural Produce Market Committee, Surat	Sardar Market, Puna-Kumbharia, Dumbhal	Surat	Neelesh L. Thorat	396010	9824119366	apmesurat1@gmail.com	2336453	2369175
2	Ahmed Overseas	Survey No. 270 P. 3, Plot No. 2, At: Makhiyada	Junagadh	Sorathia Faisal Azizbhai	362011	-	ahmed.overseas@gmail.com	2661975	2661975
3	Desai Fruits And Vegetables Pvt. Ltd.	House No.426, Desai Falia, At & Po.Amadpore . N.H. No.8	Navsari	Mr. Sanjay Gupta	396445	9099070002	bharat.pate@desaifv.com	281547	281546
4	Dhara Foods Pvt. Ltd.	Gokul Near Ramji Mandir Station Road	Anand	Dharmendra Patel	388001	9825077579	dharafoods99@gmail.com	240743	243777
5	Divya Corporation	Junagadh Highway, Plot No. 39, Tal.Keshod	Agatrai	Jayesh Prabhudas Badami	362222	8140403888	divya_corp@rediffmail.com	253531	253591
6	Earth Expo Company	Industrial Plot Number 305, Vartej Gidc	Bhavnagar	Pravin Valanki	364060	9898419831	buy4earth@gmail.com	2471400	
7	Elite Green Pvt. Ltd.	A-806 , 8Th Floor Privilon, B/H Iscon Temple, Ambli Bopal Road,	Ahmedabad	Raghulal	380054	9978984995	s.maya@eliteindia.com	40324245	40324246
8	Fuletra Agro Food	Survey No 148 & 149, B/H Sardar Patel Industrial Estate Village	Rajkot	Aiman R Bhesdadiya	363621	9913700059	fuletrafood@gmail.com	2463060	24603060
9	Gajamand Foods Pvt.Ltd.	1St Floor Gajamand House Opp. Jitendra Shopping	Ahmedabad	Jayeshbhai	380061	9879111544	export@gajamand.com	9879111544	987911544
10	Gayatri Psyllium Industries	70, Khadia Gunj Bazaar	Unjha	Anit M Patel	384170	9825033422	info@gayatripsyllium.com	254141	254141
11	Ghanshyam Traders	Victor By Pass, Near Railway Crossing	Mahuva	Bhadresh Surani	364290	9726998383	info@ghanshyamtraders.com	294219	294219
12	Jalaram Agriexports Pvt. Ltd.	C-407, 4Th Floor, The Imperial Heights, 150 Ft., Ring Road, Opp.	Rajkot	Mr.Hiren Kotecha	360005	9825057255	jalaram13@jalaramagri.com	221413	221513
13	Kitchen Xpress Overseas Ltd.,	Ramdev Estate, Nr. Sola Overbridge, Sarkhej-Gandhinagar	Ahmedabad	Gargi Desai	380060	9662538828	documents@kxol.in	268371	268380
14	Ldh Agro Food Private Limited	201 & 202, Lakulesh Complex, Near Dilux Cross Road, Nizampura	Vadodara	Sunil Shah	390002	9484468212	shahsunil38@yahoo.in	9428588888	9428588888
15	Mz Food Products Pvt. Ltd.	C-31, Ratilal Park Society, St. Xaviers High School Road,	Ahmedabad	Nirav Patel	380009	9712325000	nirav@mzfoodproducts.com	271656	271156
16	Patson Foods India Private Limited	Block No.888, Vada Road N.H.No. 8, Ganesh Sisodara	Navsari	Arvindbhai	396445	9825083811	info@patsonfoods.com	237701	237701
17	Shree Bhagwati Enterprise	Plot No.219, G.I.D.C.-2, Dolapara	Junagadh	Chimanlal Rughathbhai Kanabar	362037	9925032602	bejunagadh@gmail.com	2660486	2660386
18	Shreeji Protein	Behind Kisan Society, Victor Road, Dist. Bhavnagar	Mahuva	Aravind Senta	364290	9898878568	sales1@shreejiprotein.com	223940	223944
19	Varsha Industries Pvt.Ltd.	Survey No.35, Rajkot Highway, Opp.Mahasagar Petrol Pump,	Junagadh	Praful B Desai	362310	9426834031	does@varshaindustries.co.in	2661800	2660059

Source: APEDA Directory (https://itrack.apeda.gov.in/onlineregistration/Directory_ExpList.aspx) accessed October 2019

2) Natural Honey

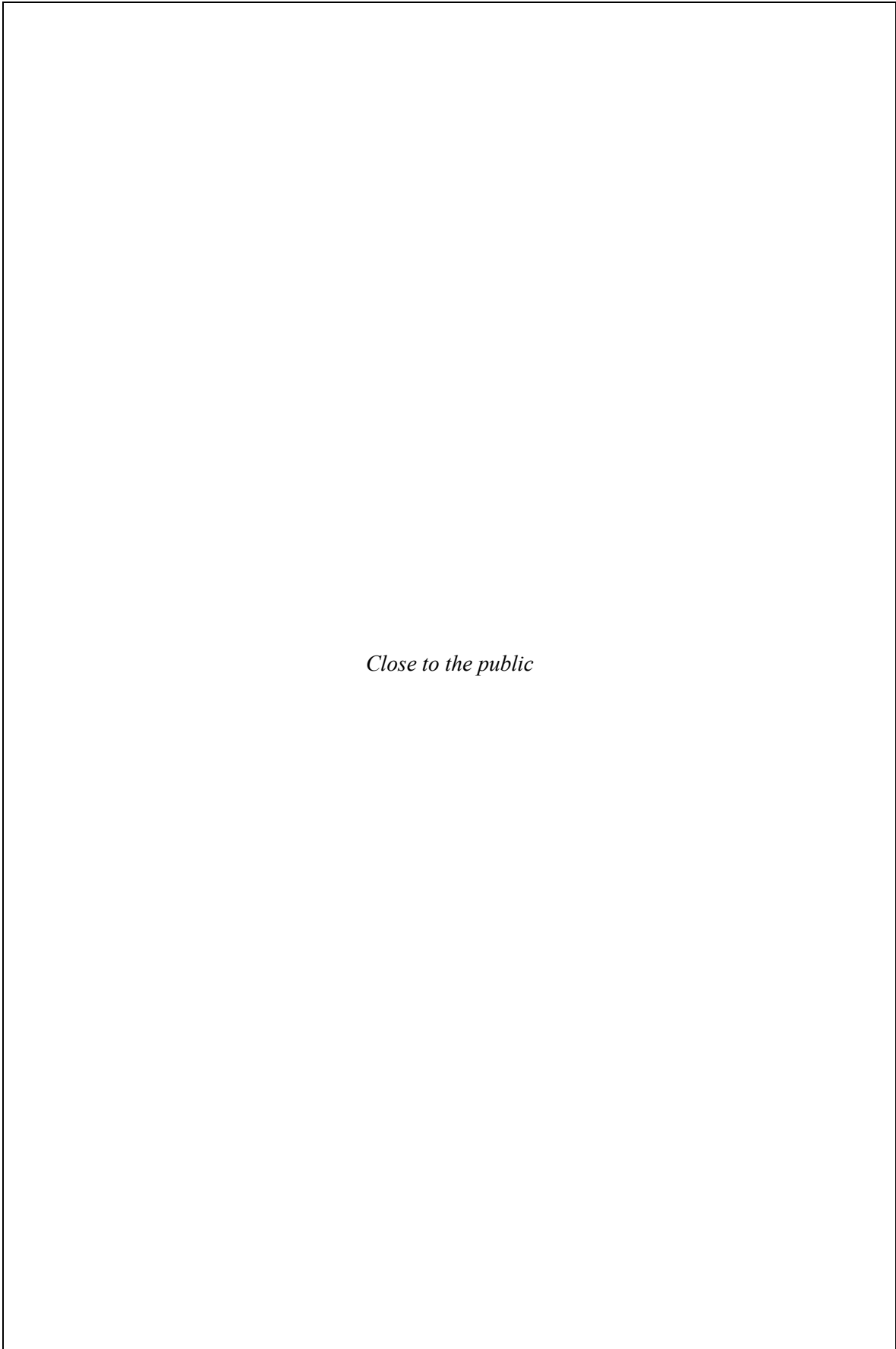
Sl. No	Name of Manufacturer cum Merchant	Address	City	Pin Code	Contact Person	Mobile No	E-mail	Phone	Fax
1	Adf Foods Limited	83/86, G.I.D.C. Industrial Estate	Nadiad	387001	Mr. Bimal Ramesh Thakkar	9323352244	brabhar@adf-foods.com	61415555	61415577
2	Badani Corporation	Rajkot Road, Survey No.10/3, Plot 1 & 2, Opp/Dipak Petrol Pump, Dolapura	Junagadh	362003	Kamlesh Badani	9825075941	badani.kamlesh@gmail.com	2680091	2680092
3	Bombaywala Puranpoli Private Limited	602, 6Th Floor, Atlanta Tower, Nr. S Ears Tower Gulbai Tekra	Ahmedabad	380006	Chitra Gupta	9537000200	bombaywallapp@me.com	48900886	65418777
4	Earth Expo Company	Industrial Plot Number 305, Vartej Gide	Bhavnagar	364060	Pravin Valanki	9898419831	buy4earth@gmail.com	2471400	
5	Fuletra Agro Food	Survey No 148 & 149, B/H Sardar Patel Industrial Estate Village Kherva Kuvadva	Rajkot	363621	Atman R Bhesadiya	9913700059	fuletrafood@gmail.com	2463060	24603060
6	Green Fibres Foods (India) Pvt. Ltd.	Block No.955, Railway Crossing National Highway No.8, Degam, Tal: Chikhli,	Navsari	396530	Hareesh Savaliya	9825043095	greenfibrefoods@yahoo.com	237701	237701
7	Gujarat Co-Op Milk Marketing Federation Ltd	Post Box No. 10, Amul Dairy Road	Anand Ahmedabad	388001	Jayen Mehta	9375032287	mukeshdave@amul.coop	258506	240208
8	Jalaram Agriexports Pvt. Ltd.	C-407, 4Th Floor, The Imperial Heights, 150 Ft., Ring Road, Opp. Big Bazar	Rajkot	360005	Mr.Hiren Kotecha	9825057255	jalaram13@jalaramagri.com	221413	221513
9	Ldh Agro Food Private Limited	201 & 202, Lakulesh Complex, Near Dilux Cross Road, Nizampura	Vadodara	390002	Sunil Shah	9484468212	shahsunil38@yahoo.in	9428588888	9428588888
10	Patson Foods India Private Limited	Block No 888, Vada Road N.H.No. 8, Ganesh Sisodara	Navsari	396445	Arvindbhai	9825083811	info@patsonfoods.com	237701	237701
11	Shree Bhagwati Enterprise	Plot No.219, G.I.D.C.-2, Dolapara	Junagadh	362037	Chimankal Rugmathbhai Kanabar	9925032602	bejunagadh@gmail.com	2660486	2660386
12	Vadlial Industries Ltd.	Vadlial House, 53, Shrimati Society, Navrangpura	Ahmedabad	380009	Mr.Rajesh Gandhi	9426173896	smvyas@vadlialgroup.com	26564018	26564027
13	Varsha Industries Pvt.Ltd.	Survey No.35, Rajkot Highway, Opp.Mahaagar Petrol Pump, Sukkpur	Junagadh	362310	Pratul B Desai	9426834031	docs@varshaindustries.co.in	2661800	2660059
14	Yours Ethnic Foods Private Limited	3/D Nidhisiri Corporation Nr. Vimal ,House Vitthalbhai Patel So.Stadium	Road Navrangpura Ahmedabad	380013	Nilambhai Narendrabhai Patel	8511226919	account@yoursfoods.com	7096670300	26404050

Source: APEDA Directory (https://itrack.apeda.gov.in/online-registration/Directory_ExpList.aspx) accessed October 2019.

3) Companies with Which the JICA Study Team had Preliminary Discussions

Close to the public

**Annexure 6.13: TOR for NGOs to be Engaged for Pilot Project for Building
Responsible Supply Chain**



Close to the public

Annexure 6.14: List of Government Schemes/Programmes Relevant to Strengthening Value Chain

Component	Subsidy Details	Remarks
Spice Crops to Increase Productivity		
Seed spices and rhizomatic spices	Unit cost: INR 30,000 per ha In general areas, a maximum of INR 12,000 per ha. (40% of cost) In Tribal Sub Plan areas, a maximum of INR 15,000 per ha. (50% of cost) Area limited to 4 ha	Expenditure on planting material and cost of INM*/IPM** etc. Additional subsidy given by state government to general category is 15%, and 25% for reserved category.
For Planting Materials		
Infrastructure (for handling, processing, packing, storage etc. of seeds meant for use as seed material for cultivation of horticulture crops)	Unit cost: INR 20 million per ha Public sector: 100% of the unit cost. Private sector: 50% of the unit cost. One-time subsidy.	Project based. Credit linked back ended subsidy. Additional subsidy given by state government to general category is 15%, and 25% for reserved category.
Organic Farming		
Adoption of organic farming	Unit cost: INR 20,000 per ha 50% of cost limited to INR 10,000/ha. Maximum area of 4 ha per beneficiary The subsidy is given in 3 splits, first year INR 4,000, second and third years INR 3,000 is allotted.	Program to be linked with certification Certification should be done through the agency accredited by APEDA.
Organic certification	For cluster of 50 ha INR 5 lakh for a cluster. The subsidy is allotted in 3 splits, which include in the first year INR 150,000, in the second year INR 150,000 and in the third year INR 200,000.	Project based program linked with certification. Certification should be done through the agency accredited by APEDA.
Certification for Good Agricultural Practices (GAP), including infrastructure	Unit cost: INR 10,000 per ha 50% of cost for maximum area of 4 ha per beneficiary	Certification should be done through the agency accredited by APEDA. Additional subsidy given by state government to general category is 15%, and 25% for reserved category.
Post-Harvest Facilities		
Pack house (size 9m X 6 m)	Unit cost: INR 400,000 per unit 50% of the unit cost limited maximum to INR 200,000 per unit	Project based.
Integrated pack house with facilities for conveyer belt, sorting, grading units, washing, drying and weighing. (size 9 m X 18 m)	Unit cost: INR 5 million per unit For general category 35% of the unit cost limited to a maximum of INR 1.75 million per unit. For scheduled and hilly regions, 50% of the unit cost, limited to a maximum of INR 2.5 million per unit	Project based. Credit linked back ended subsidy.
Pre-cooling unit (capacity 6T)	Unit cost: INR 2.5 million per unit For general category, 35% of the unit cost limited, to a maximum of INR 875,000 per unit For scheduled and hilly regions, 50%	Project based. Credit linked back ended subsidy. Additional subsidy given by state government to general

Component	Subsidy Details	Remarks
	of the unit cost, limited to INR 1.25 million per unit.	category is 15%, and 25% for reserved category.
Farm Mechanization		
Tractor (up to 20 PTO***)	Unit cost: INR 300,000 per unit Subsidy for general farmers is 25% of cost, subject to a maximum of INR 75,000 per unit. Subsidy for small/marginal farmers, SC/ST farmers/women farmers is 5% of cost, subject to a maximum of INR 100,000 per unit.	Purchase of unit has to be done from the list of companies empaneled by Agriculture Department.
Tractor/power tiller (below 8 BHP) driven equipment		
Planting, reaping and digging equipment	Unit cost: INR 30,000 per unit Subsidy for general farmers is 40% of cost, subject to a maximum of INR 12,000 per unit. Subsidy for small/marginal farmers, SC/ST farmers/women farmers is 50% of cost, subject to a maximum of INR 15,000 per unit.	Purchase of unit has to be done from the list of companies empaneled by Agriculture Department
Plastic mulch laying machine	Unit cost: INR 70,000 per unit Subsidy for general farmers is 40% of cost, subject to a maximum of INR 28,000 per unit. Subsidy for small/marginal farmers, SC/ST farmers/women farmers is 50% of cost, subject to a maximum of INR 35,000 per unit.	Purchase of unit has to be done from the list of companies empaneled by Agriculture Department.
Self-Propelled horticulture machinery	Unit cost: INR 250,000 per unit Subsidy for general farmers is 40% of cost, subject to a maximum of INR 100,000 per unit. Subsidy for small/marginal farmers, SC/ST farmers/women farmers is 50% of cost, subject to maximum of INR 125,000 per unit.	Purchase of unit has to be done from the list of companies empaneled by Agriculture Department
Establishing Market Infrastructure		
Rural markets/apni mandies/direct markets	Unit cost: INR 2.5 million per project 40% of capital cost of project in general areas and 55% in case of hilly & scheduled areas, per beneficiary.	Project based. Credit linked back ended subsidy.
Collection, Sorting, Grading, Packing Unit		
Collection, sorting/grading, packing unit etc.	Unit cost: INR 1.5 per project 40% or maximum INR 600,000 per unit of capital cost of project in general areas and 55% or maximum INR 825,000 per unit in case of hilly & scheduled areas, per beneficiary.	Project based. Credit linked back ended subsidy.

*INM: Integrated Nutrient Management

** IPM: Integrated Pest Management

***PTO: Power Take Off

Many more subsidies including financial assistance for training and study tours are available from the site.

Source: Compiled by the JICA Study Team based on the website of the Agriculture, Farmers Welfare & Co-operation Department, Government of Gujarat. (<https://agri.gujarat.gov.in/horticultural-aid-schemes.htm>)

Annexure 6.15: TOR for PMC Supply Chain Specialist

Close to the public

Annexure 6.16: Detailed Implementation Plan for Pilot Project for Building a Responsible Supply Chain

Activity	Year												Month	
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031		
6.3 Pilot Project for Building a Responsible Supply Chain	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6.3.4 (2) Identification of Cluster/Producer Organisation	6	0	0	0	0	0	0	0	0	0	0	0	0	6
6.3.4 (3) Market Survey	5	0	0	0	0	0	0	0	0	0	0	0	0	5
6.3.4 (4) Situational Analysis	4	0	0	0	0	0	0	0	0	0	0	0	0	4
6.3.4 (5) Identification of the Buyer/Manufacturer	4	0	0	0	0	0	0	0	0	0	0	0	0	4
6.3.4 (6) Development of the Project Plan and Signing of Tripartite Agreement	1	3	0	0	0	0	0	0	0	0	0	0	0	4
6.3.4 (7) Procurement and Engagement of NGO for Supporting Producer Organisation	0	9	12	9	0	0	0	0	0	0	0	0	0	30
6.3.4 (8) Implementation of the Pilot Project	0	6	12	9	0	0	0	0	0	0	0	0	0	27
6.3.4 (9) M&E	0	3	12	9	0	0	0	0	0	0	0	0	0	24
6.3.4 (10) Documentation and Development of Replicable Model and Roll out	0	0	0	6	0	0	0	0	0	0	0	0	0	6

Source: JICA Study Team (2019)