

8-2 クエッションネアア-

QUESTIONNAIRE

ON

UPPER KOTMALE HYDROELECTRIC POWER DEVELOPMENT PROJECT

JANUARY, 1985

Preliminary Survey Team of JICA



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1. General

Item	Description	Availability; (Please attach document herewith unless enough space.)
<p>1. The Authorities directly and indirectly concerned with the implementation of the F/S of the Upper Kotmale Project</p>	<ul style="list-style-type: none"> <li>- Name of Authority</li> <li>- Address</li> <li>- Responsible person</li> </ul>	<ul style="list-style-type: none"> <li>- Ceylon Electricity Board (C.E.B)</li> <li>- 50, Sir Chittampalam A. Gardiner Mawatha, Colombo 2</li> <li>- General Manager</li> <li>- Democratic, Multi Religious.</li> </ul>
<p>2. Type of politics, religion, national festival days and holidays</p>		<p>Democratic, Multi Religious.</p>
<p>3. Races and population</p>		<p>Multi Racial, 15 million (Approx)</p>
<p>4. Currency</p>	<ul style="list-style-type: none"> <li>- Local currency</li> <li>- Location of bank</li> <li>- Exchange rate (US\$, local currency).</li> </ul>	<ul style="list-style-type: none"> <li>- Rupees (Rs)</li> <li>- Colombo and Major Towns</li> <li>- 1 US Dollar = Rs 26.5 (Approx)</li> </ul>
<p>5. Published statistics</p>	<ul style="list-style-type: none"> <li>- Statistical annuaries of economy, industry, trade, etc.</li> <li>- Electric power annual report</li> </ul>	<ul style="list-style-type: none"> <li>- "Economic &amp; Social Statistics of Sri Lanka (Statistics Department Central Bank of Ceylon)" Attached</li> <li>- "Ceylon Electricity Board Annual Report (Year ended December 31, 1982)"</li> </ul>
<p>6. Natural conditions in the working area</p>	<ul style="list-style-type: none"> <li>- a. Topography; Average land slope, altitude (maximu, minimum)</li> <li>- b. Vegetation; Types, density, tree height, diameter at the chest level.</li> <li>- c. Climatic conditions; Dry season: From (month) to (month)</li> <li>Rain season: From (month) to (month)</li> </ul>	<ul style="list-style-type: none"> <li>a. Altitude min. 700m. max. 2600 m. Average land slope 0.3</li> <li>b. Vegetation - Tea</li> <li>c. Dry season - December to March</li> <li>Rain season - May to November</li> <li>Avrg. Temp. - 18°C</li> <li>Rel. Humidity - 70 percent</li> </ul>

Item	Description	Availability; (Please attach document herewith unless enough space.)
<p>7. Access to the working area</p> <p>8. Transportation of equipment and materials</p> <p>9. Customs clearance</p>	<p>Monthly average temperature: °C</p> <p>Wind direction, wind velocity (monthly average)</p> <p>Number of days with fine weather (monthly average)</p> <p>- d. Dangerous animals, etc., habitat.</p> <p>- e. Quality of potable water</p> <p>- Route from Colombo to the working area</p> <p>- Means of transportation</p> <p>- Time required</p> <p>- Route from Colombo to the working area</p> <p>- Means of transportation, cost (US\$)</p> <p>- Time required</p> <p>- The authority concerned</p> <p>- Address</p> <p>- How to obtain import and re-export license</p> <p>- Time required for customs clearance</p>	<p>Wind velocity - 130 km/h (max.)</p> <p>d. Dangerous animals - None</p> <p>e. Quality of potable water - Good</p> <p>- Motorable Roads Available</p> <p>- Car, Van, Lorry, Truck etc.</p> <p>- 5 Hours (Approx)</p> <p>- Same as Above</p> <p>-</p> <p>- 5 Hours (Approx)</p> <p>- Sri Lanka Customs Department</p> <p>- Chaithiya Road, Colombo 5</p> <p>- Apply for Permit from Import and Export Control Dept, Chatham St. Colombo 1.</p> <p>- Within one week</p>

2. Electric Power Situation in Sri Lanka

Item	Description	Availability; (Please attach document herewith unless enough space.)
1. Existing supply facilities	<ul style="list-style-type: none"> <li>- Power station name, location map, type (hydroelectric/thermoelectric), installed capacity, date of completion.</li> </ul>	<ul style="list-style-type: none"> <li>"Transmission Network and List of Power station and List of Grid Substation"</li> </ul>
2. Power stations under construction	<ul style="list-style-type: none"> <li>- Power station name, location map, type (hydroelectric/thermoelectric), installed capacity, scheduled date of completion.</li> </ul>	<ul style="list-style-type: none"> <li>"List of Power Station (Existing Power Stations, Under Construction, Being Planned)</li> </ul>
3. Power stations being	<ul style="list-style-type: none"> <li>- Power station name, location map, type (hydroelectric/thermoelectric), installed capacity.</li> </ul>	<ul style="list-style-type: none"> <li>"Long Range Expansion Plan (1985 ~ 2004)"</li> </ul>
4. Existing power stations and power stations under construction	<ul style="list-style-type: none"> <li>- Location, date of completion, installed capacity.</li> </ul>	Attached
5. Existing transmission lines and transmission lines under construction	<ul style="list-style-type: none"> <li>- Transmission line network map, power transmission capacity.</li> </ul>	Attached
6. Demand forecast	<ul style="list-style-type: none"> <li>- Long-term demand forecast (maximum kW, kWh)</li> </ul>	<ul style="list-style-type: none"> <li>"Generation and Malimum Demand Forecast from 1983 to 1994"</li> </ul>
7. Power demand	<ul style="list-style-type: none"> <li>- Daily load curve, weekly load curve</li> <li>- Daily load cumulative curve, weekly load cumulative curve.</li> <li>- Power consumption (%)                             <ul style="list-style-type: none"> <li>a. Ordinary home</li> <li>b. Industry</li> <li>c. Commerce</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>"Power consumption (%)"</li> <li>"Daily Load Curve and Load Duration Curve"</li> <li>"Weekly Load Curve and Load Duration Curve"</li> </ul> Attached

Item	Description	Availability; (Please attach document herewith unless enough space.)
8. Supply planning	d. Others - Power loss (%) - Long-term supply planning (maximum kW, kWh)	



3. Existing Survey Data

Item	Description	Availability; (Please attach document herewith unless enough space.)
3-1 <u>Topographical Maps</u>		
(1) Existing maps	<ul style="list-style-type: none"> <li>- Scale, mapping organization, mapping date</li> <li>- Index sheet</li> </ul>	<ul style="list-style-type: none"> <li>- Scale 1 inch = 1 mile (1:63360)</li> <li>- Index Map of Ceylon, Attached</li> </ul>
(2) Detailed topographical map at the vicinity of Upper Kotmale	<ul style="list-style-type: none"> <li>- Scope, aerial surveying map or ground surveying map, scale, mapping organization, mapping date, index sheet, spacing of contour lines.</li> <li>- Existence of duplicate map</li> <li>- If the said map exists, possibility of taking it outside the country.</li> </ul>	<ul style="list-style-type: none"> <li>- Aerial Photographs 1:40,000 (1956)</li> <li>- Not available</li> </ul>
(3) Positive films	<ul style="list-style-type: none"> <li>- Location and altitude of the control point at the vicinity of Upper Kotmale</li> </ul>	<ul style="list-style-type: none"> <li>- The area is covered by a series of primary, secondary and tertiary trigonometrical stations. Two lines of levels are available on Kandy-Nuwara Eliya road and Lindula-Nanu Oya Road.</li> </ul>
(5) How to obtain the existing data and to take them outside the country	<ul style="list-style-type: none"> <li>- How to obtain the required authorization</li> </ul>	
3-2 <u>Hydrological and Meteorological Data</u>		
(1) Rainfall	<ul style="list-style-type: none"> <li>- Name and location map of the pluviometric stations</li> </ul>	<ul style="list-style-type: none"> <li>- "Kotmale Oya Catchment Area Rainfall &amp; Gauging Stations" Attached</li> <li>- Rainfall records are available.</li> </ul>

Item	Description	Availability; (Please attach document herewith unless enough space.)
(2) Run-off	<ul style="list-style-type: none"> <li>- Daily run-off record</li> <li>- Name and location maps of the water gauging stations</li> <li>- Daily run-off record</li> </ul>	<ul style="list-style-type: none"> <li>- Gauging stations - Morape (upstream of Kotmale Dam Site) Talawakelle, available from 1950.</li> </ul>
(3) Flood flow	<ul style="list-style-type: none"> <li>- Record maximum flood</li> </ul>	<ul style="list-style-type: none"> <li>- New Station Caledonia established in 1984.</li> </ul>
(4) Evaporation	<ul style="list-style-type: none"> <li>- Evaporation and dispersion record</li> <li>- Observation location and observation method</li> </ul>	<ul style="list-style-type: none"> <li>- Morape flows annexed</li> <li>- Reports for the design of Kotmale Dam are available.</li> <li>- N'Eliya (Nuwaraeliya) Attached</li> </ul>
(5) Climate	<ul style="list-style-type: none"> <li>- Observation record of temperature, humidity, wind idirection and wind velocity.</li> </ul>	<ul style="list-style-type: none"> <li>- Data available</li> </ul>
(6) Deposited silt	<ul style="list-style-type: none"> <li>- Suspended sediment observation record</li> <li>- Silt sedimentation measurement record of existing storage reservoirs.</li> </ul>	<ul style="list-style-type: none"> <li>- Not Available</li> </ul>
3-3 <u>Geological Data</u>		
(1) Wide scope geological map	<ul style="list-style-type: none"> <li>- Scale</li> </ul>	<ul style="list-style-type: none"> <li>- Scale 1. inch to a mile (1:63360)</li> <li>- "Mahaiseli Ganga Bain, Geology" Attached</li> </ul>
(2) Geological map at the vicinity of Upper Kotmale	<ul style="list-style-type: none"> <li>- Scale</li> </ul>	<ul style="list-style-type: none"> <li>- Not available</li> </ul>
(3) Geological survey re-	<ul style="list-style-type: none"> <li>- Date of preparation, author(s)</li> </ul>	<ul style="list-style-type: none"> <li>- Reports available</li> </ul>

Item	Description	Availability: (Please attach document herewith unless enough space.)
<p>(4) Reports on earthquake and volcanic activities</p> <p>(5) Hydrological and geological data</p>	<ul style="list-style-type: none"> <li>- Date of preparation, author(s)</li> <li>- Ground water level observation</li> <li>- Spring water sites</li> <li>- Water quality sites</li> <li>- Suspended sediment observation</li> </ul>	<p>"Extract from UNDP/FAO Report" Attached</p> <ul style="list-style-type: none"> <li>- Not available</li> <li>- Not Available</li> </ul>

4. Matters Related to the Implementation of the Surveys

Item	Description	Availability: (Please attach document herewith unless enough space.)
<p>4-1 Preparation of the Topographical Map (Only when the 1/5,000 aerophotographic map under item 3-1 is not available.)</p>	<ul style="list-style-type: none"> <li>- We would like to know the policy and idea of the Sri Lankan authorities concerned, regarding the future preparation of this topographical map.</li> <li>- Name, address, equipment/facilities of the company able to carry out the mapping.</li> </ul>	<ul style="list-style-type: none"> <li>- CECB will arrange with the Survey Department to prepare 1:10,000 topographical maps and 1:5,000 topographical maps for the areas demarcated; from aerial photographs.</li> </ul>
<p>4-2 Implementation of the Physical Prospecting</p>	<ul style="list-style-type: none"> <li>- We would like to know the policy and idea of the Sri Lankan authorities concerned; regarding the implementation of physical prospecting.</li> <li>- Name, address, equipment/facilities of the company able to implement the physical prospecting.</li> </ul>	<ul style="list-style-type: none"> <li>- Not Available</li> </ul>
<p>4-3 Implementation of Drilling Work</p>	<ul style="list-style-type: none"> <li>- We would like to know the policy and idea of the Sri Lankan authorities concerned, regarding the implementation of the boring work.</li> <li>- Name, address, equipment/facilities of the company able to implement the boring work.</li> </ul>	<ul style="list-style-type: none"> <li>- CECB will arrange for core drilling with the irrigation Department or other agency</li> </ul>
<p>4-4 Tests and Analyses</p>	<ul style="list-style-type: none"> <li>- Aggregates test, soil test, suspended sediment analysis, etc.</li> </ul>	<ul style="list-style-type: none"> <li>- CECB will arrange for Aggregate tests, soils tests and other tests to be carried out at the laboratories of the Irrigation Department, University of Sri Lanka, National Building Research Organization and a number of private firms.</li> </ul>

5. Data for Preparation of the Development Plan

Item	Description	Availability; (Please attach document herewith unless enough space.)
<p>1. Report of existing plan plans proposed for development of the Mahaweli River basin</p> <p>2. Report of the existing plans proposed for development of Upper Kormale</p> <p>3. Future development of the periphery of the Mahaweli River</p>	<p>- Prepared by: - Date of preparation - Evaluation of the report</p> <p>- Prepared by: - Date of preparation - Evaluation of the report</p> <p>- Flood control plan - Irrigation plan - Industrial estate plan</p>	<p>- Relevant extracts from UNDP-FAO report on Mahaweli Ganga Irrigation and Hydropower Survey (1969) on Upper Kormale Projects are annexed. "Kotmale Hydropower Project (Technical Brochure)" "Kotmal Hydropower Project" "Power for Prosperity (CEB)" "Mahaweli Project &amp; Programme (Ministry of Mahaweli Development)" "Upper Kotmale Project Location Map" "Programme for Feasibility Studies of Medium Size Hydro Power Schemes in the Mahaweli Basin" "Upper Kotmale Project, Location of Schemes in the Master Plan" "Profiles of UNDP/FAO &amp; WAPCOS Schemes and Alternative-1." "Theoretical Power Potential in the River" Attached</p>

6. Construction Cost Estimation Data

Item	Description	Availability; (Please attach document herewith unless enough space.)
1. Price list of materials, machinery and equipment (Government publication)	- Cement, aggregate, reinforcing bar, steel materials, mould made of steel, sheet piles, wood, dynamite, etc. (US\$/ton)	- Cement - Rs.133 per 50 kg-Colombo Aggregate-Metal - Rs.250 per cu.m -Colombo Aggregate-Sand - Rs.100 per cu.m -Colombo Reinforcing-Steel - Rs.12,000 per Tonne-Colombo Timber (Class I) - Rs.5,000 per cu.m.-Colombo
2. Unit cost of labor	- Senior foreman, foreman, labor, miner, carpenter, bar bender, operator, driver, driller, grout man, etc. (US\$/man-month)	- Local labour-unskilled - Rs.60.00 per day Semiskilled - Rs.75.00 per day Skilled - Rs.90.00 per day
3. Construction machinery	- Types and acquisition costs of domestic construction machinery Bulldozer, wheel loader, dump truck, tamping roller, truck mixer, compressor, concrete pump, vibrator, jack hammer, etc. (US\$/unit)	
4. Steel product import price (CIF)	- Gates, iron pipes, etc. (US\$/ton) (Example of hydroelectric power plants under construction)	
5. Electric machinery import costs (CIF)	- Turbine, generator, transformer, switchboard, etc. (Example of hydroelectric power station under construction)	"The Gazette of the Democratic Socialist Republic of Sri Lanka" Attached
6. Transmission line construction cost	- US\$/kW.km	- "Transmission Line Coats" Attached

Item	Description	Availability; (Please attach document herewith unless enough space.)
<p>7. Custom duties for im-port</p> <p>8. Indemnification for resettlement of local residents</p> <p>9. Interest rate</p> <p>10. Escalation rate of commodity prices</p>	<p>- Construction machinery and materials</p> <p>- Unit cost of indemnification of land, house, etc.</p>	<p>- "The Gazette of the Democratic Socialist Republic of Sri Lanka" Attached</p> <p>- Wholesale Price Index - Average 12 percent.</p>

7. Economic Evaluation

Item	Description	Availability; (Please attach document herewith unless enough space.)
1. Unit cost of construction	<ul style="list-style-type: none"> <li>- Unit cost for construction of thermolectric and hydroelectric power plants under construction and finished of late (US\$/kW, US\$/kWh)</li> </ul>	<ul style="list-style-type: none"> <li>- "Construction Costs of Hydroelectric Plants and Thermolectric Plants" Attached</li> </ul>
2. Economic evaluation	<ul style="list-style-type: none"> <li>- I.R.R. of hydroelectric power plants finished of late or under construction</li> </ul>	
3. Power rate	<ul style="list-style-type: none"> <li>- Power rate system</li> <li>- Power selling unit price (US\$/kWh)</li> </ul>	
4. Fuel cost	<ul style="list-style-type: none"> <li>- Fuel cost of thermolectric power stations finished of late.</li> </ul>	<ul style="list-style-type: none"> <li>- "Fuel Costs and Units Generated" Attached</li> </ul>
5. Operation, maintenance and management costs	<ul style="list-style-type: none"> <li>- Costs of hydroelectric and thermolectric power plants (US\$/year)</li> </ul>	<ul style="list-style-type: none"> <li>- "Fixed O &amp; M Cost"</li> <li>- "Data on Existing Hydro Plants (Scheduled Maintenance, F.O.R (%))"</li> </ul>



8. Matters during the Field Survey Period

Item	Description	Availability; (Please attach document herewith unless enough space.)
1. Necessity of field camp		- Need to be Discussed
2. Location of places appropriate as working bases		- Need to be Discussed
3. Hotel appropriate as working base or office	- Name, address, and charge of the hotel	- Several Hotels are Available in Nuwarreliya. A List will be Provided Later
4. Power (voltage, frequency) and communication facilities		- 230/415 V, 50 Hz Telephone Facilities Available in most Places.
5. Places for procurement of potable water, food-stuff, fuel, etc. in the case of camping at the work site, as well as routes for their transportation and means of transportation		- Nearest Town
6. Epidemics and local diseases		- No
7. Nearby hospitals	- Address, equipment/facilities, etc.	- Available in most Towns
8. Automotive vehicle repair garage	- Address, equipment/facilities, etc.	- Available in most Towns
9. Local labor available	- Types of labor (ordinary labor	

Item	Description	Availability; (Please attach document herewith unless enough space.)
10. Use of equipment generating electric waves (transceivers)	<ul style="list-style-type: none"> <li>- cook, driver, interpreter, etc.)</li> <li>- Laws and regulations pertaining to employment</li> <li>- Wages</li> <li>- How to employ local labor (procedures)</li> <li>- Name of laws and regulations pertaining to the matter</li> <li>- Authorities with jurisdiction on the matter</li> <li>- How to obtain authorization for use</li> </ul>	<ul style="list-style-type: none"> <li>- Need to be Discussed</li> <li>- Contact Telecommunication Dept.</li> </ul>
11. Labor	<ul style="list-style-type: none"> <li>- Labor laws and regulations</li> <li>- Holidays and days off</li> <li>- Daily working hours</li> <li>- Additional wages when working on holidays, days off and overtime.</li> </ul>	<ul style="list-style-type: none"> <li>- Contact Labour Dept.</li> </ul>
12. Entrance to land and forest protection	<ul style="list-style-type: none"> <li>- Authorization to enter and survey private land</li> <li>- Authorization for felling for the purposes of the survey</li> </ul>	<ul style="list-style-type: none"> <li>- Obtain Permission from the Government Agent of the Area.</li> </ul>
13. Protection of fur and feather	<ul style="list-style-type: none"> <li>- Types of fur and feather subject to protection</li> <li>- Protection areas</li> </ul>	<ul style="list-style-type: none"> <li>- Not Applicable to this Project</li> </ul>
14. Means of transportation	<ul style="list-style-type: none"> <li>- Possibility of hiring jeeps, trucks, boats, helicopters, etc.</li> <li>- Hire of the said means of transportation</li> </ul>	<ul style="list-style-type: none"> <li>- Need to be Discussed</li> </ul>

8-3 収集資料リスト

主 管 部 長	文 書 管 理 課 長	主 管 課 長	情 報 管 理 課 長	図 書 資 料 室 受 付 印
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昭和 年 月 日 作成

地 域	ア ジ ア	アメリ カ	英 国	調 査 団 等 名 称		ア ッ パ ー、コ ト マ レ 水 力 発 電 調 査 計 画、予 備 調 査 印		調 査 の 種 類		予 備 調 査		作 成 部 課					
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収集資料リスト

三管 部長	文書管理課長	主管 課長	情報管理課長	図書資料室受付印
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昭和 年 月 日 作成

地 域	ア ジ ア	ア ス	ラ ン カ	調査団 等名称	調査の種別		調査の種別	現地調査期間	作成 部署			
					予 備 調査	調査 期間						
国 名	アッパー、コトマレ水カ発電開発計画、予備調査団				50年2月18日～60年3月7日	担当者氏名						
番号	資料 名	形 態	版 型	ペ ージ数	オリジナル コピーの別	部数	収録名称又は発行機関	寄贈・購入 価格の別	取扱い 区分	利用 氏名	納入 予定日	納入 確認
33	DAILY AVERAGE DISCHARGE IN M <sup>3</sup> /sec Station Calldoria	表	A4・A3	4	Copy	1	CEB	寄 贈				
34	GEOLOGICAL MAP OF SRI LANKA	図		1	"	1	CECB	"				
35	MAHAWELI GANGA BASIN CEYLON GEOLOGY	"		1	Original	1	SURVEY DEPARTMENT	購 入				
36	SRI LANKAS SATELLITE IMAGE MOSAIC 1:500,000	"		1	"	1	"	"				
37	SRI LANKA ELECTORAL MAP (1/253440) 1976	"		4枚 1組	"	1×4	"	"				
38	non title, drainagl Pattern of SRILANKA (1/50688)	"		1	"	5	"	"				
39	PERMEABILITY TEST (透水試験法の説明および実施例)	表	A4	2	Copy	1	CECB	寄 贈				
40	湖水源の目録表資料	表	"	28	"	1	CEB	"				
41	UNDP/FAO reportの抜粋 Mahaweli Ganga Cascado Water and Power Parameters etc.	"		3	"	1	"	"				
42	Map of Catchment area (Talawakele)	図		1	"	1	"	"				
43	POWER FOR PROSPERITY (CEBのパンフレット)	パンフレット	A4	29	Original	1	"	"				
44	ECONOMIC & SOCIAL STATISTICS OF SRI LANKA	製本		91	"	1	"	"				
45	CEYLON ELECTRICITY BOARD ANNUAL REPORT 1982	"	B	41	"	1	"	"				
46	SRI LANKA SOCIO-ECONOMIC DATA 1984	カード		34	"	1	"	"				
47	KOTMALE PROJECT KOTMALE OYA CATCHMENT AREA RAINFALL & GAUGING STATIONS	図		1	Copy	1	"	"				
48	KOTMALE OYA TALAWAKELLE MONTHLY FLOWS	表	A4	1	"	1	"	"				
49	MORAPE MONTHLY FLOWS	"	"	1	"	1	"	"				





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