CHAPTER 4 WETLAND CONSERVATION PLAN

4.1 Overall Frame

4.1.1 Approach and Strategy

Since LWC has been used for production, it is not appropriate to apply only the restriction of human activities for nature conservation. Therefore, the ecosystem oriented, species oriented, and awareness oriented approaches should be taken for the Wetland Conservation Plan (WCP) of LWC. The main strategies taken for LWC are a) to emphasize the biodiversity in rivers and lake, b) to preserve and conserve the wetland vegetation, c) to strengthen the function of forests, d) to manage game animals and birds through hunting, e) to promote eco-tourism for nature protection, and f) to focus on environmental education and public awareness.

4.1.2 Biotopes to be Protected

Based on the results of field survey and the secondary evaluation of vegetation, the 16 biotopes to be protected are selected, and their locations are shown in Figure 4.1.1. Out of 16 biotopes, 11 areas (from No.1 to No.11) coincide with the existing "Nature Reserves". Additional five are located in the central part of LWC to prevent fragmented distribution of protected areas. In view of the overall management policy of LWC that aims at "protect while using", areas that are used for economic activities are included like the case of Lake Lubana and fishponds. Details of each biotopes are described below by area.

List of Biotopes to be Protected in LWC

Biotope		Present status	Biotope values and possible use
Name	Area (ha)		
1. Barkava oak stand	62	○	- Forest conservation
2. Berzpils bog	3,319	○	- Raised bog conservation
3. Idinu bog	818	○	- Raised bog conservation, Eco-tourism
4. Idena and Kvapani ponds	1,116	○	- Waterfowl habitat, Eco-tourism, Aquaculture
5. Lagazas-Snitku bog	3,386	○	- Raised bog conservation
6. Lubana depressions	5,905	○	- Wildlife corridor, Forest conservation, Raised bog conservation, Eco-tourism
7. Lubana and Solagala bogs	2,899	○	- ditto
8. Parabaine	approx. 9,822	○	- Inundated meadow, Wildlife conservation, and Raised bog conservation
9. Pededze river lower stretch	4,177	○	- Wildlife conservation
10. Sala bog	3,862	○	- Raised bog conservation
11. Tirumnieki bog	266	○	- Raised bog conservation, Eco-tourism
12. Grivu	approx. 930	●	- Habitat for wildlife
13 Lower Aiviekste	approx. 1,950	●	- Habitat for fish and grassland birds
14. Nagli west	approx. 970	●	- Waterfowl habitat, Eco-tourism, Aquaculture
15. Nagli east	approx. 830	●	- ditto
16. Lake Lubana	approx. 7,700	●	- Waterfowl habitat, Fishery, Water level control

Notes : ○ = Presently designated as Nature Reserve ; ● = Proposed by the JICA study team

4.2 Wetland Conservation Plan

4.2.1 Projects and Programs for Wetland Conservation

In addition to the regulations of protected areas, biodiversity of LWC is protected by the following active measures as a potential Ramsar site. The Ramsar Convention at present aims at a comprehensive wetland biodiversity convention with extended focus such as basin management and securing fishery resources.

(1) Environmental Management Center Construction Project

The WCP would include concrete projects and programs to be implemented in line with EMP. It is necessary to establish a base for actual implementation of the proposed activities, so the construction of the Environmental Management Center (EMC) is proposed at Idena. The buildings for EMC should be facilitated main building for actual works, sub building for lodging of group visitors, and garage. The main building consists of the rooms for administration, research and monitoring, meeting, training, aquarium, display hall, and canoe/cycling service. The required staff number for administration and maintenance would be 12-15 people on a permanent basis.

(2) Biotope conservation program

This program consists of four subprograms, namely a) bird conservation sub-program, b) mammal conservation subprogram, c) bog and inundated grassland conservation subprogram, and d) fish conservation subprogram.

The bird conservation subprogram includes actual activities especially for waterfowl and raptors, such as improvement of natural breeding place, artificial breeding islands and nests, and water level control of fishponds. The mammal conservation subprogram is for conservation and population control of forested mammals including wildlife corridor construction, enrichment of forest-meadow ecotone, and beaver population control. Meanwhile, the raised bog, inundated grassland and fen are the characteristic biotopes of LWC, and water level management is commonly crucial for their conservation. Thus, the bog and inundated grassland conservation subprogram is proposed for conservation of raised bog, inundated grassland, and fen in LWC. The fish conservation subprogram consists of wintering place, patrolling, restocking, spawning place, and river water level control.

(3) Environmental research and monitoring program

As exemplified by increase of cormorants and beavers, ecological change sometimes occurs rapidly and flexible management becomes necessary. To cope with such emerging issues, research ability to indicate management directions within a few years is necessary. Research in EMC is for management purpose, and pure scientific research is limited only when they are closely linked with management. The research topics should include a) inventory work of fauna and flora including mammals, b) endangered plants and invertebrates, c) relation and trend between wetland vegetation and groundwater level,

d) ecological influence of over-growth at semi-natural pastures, e) ecological function of crop fields, f) fish resources, g) carrying capacity of eco-tourism including hunting and angling, and h) pest control and status of exotic species.

For scientific environmental management, especially for early warning, monitoring of natural environment as well as socioeconomic activities is indispensable. The items required to the Ramsar information sheet should be monitored in LWC and related areas. Dissemination of the results through EIMS in the form of annual report is strongly recommended. Original monitoring is limited mainly to faunal and floral items. Other items are collected by cooperation of other organizations.

(4) Environmental education and public awareness promotion program

By using facilities installed by the EIMS subprogram and the Environmental Education subprogram, the following activities are proposed for promotion of wetland conservation:

1) Mobile EMC

The diversity of biotopes of LWC is a precious educational value that cannot be found at other places of Latvia. Not only local sectors but also national levels should utilize the value. Because of its less known location, however, it seems difficult for EMC to have many visitors if it is a passive center just waiting for visitors to come. Environmental education and public awareness functions of EMC becomes fully operational when the center actively attracts visitors and bring services to requested places. As a program under the annual schedule, EMC organizes the following activities in close collaboration with schools and administration. Bus and accommodation facility of the center is fully utilized. Operation cost is borne by the center, but meals and accommodation are borne by visitors at cost.

2) Baltic Ramsar Center

For promoting international cooperation in wetland conservation, it is necessary to exchange information and learn each other's experiences. Since miscellaneous information in Latvia is printed in Latvian, information sources for non Latvian-speaking people in limited to those written in international languages and this never enough. Latvian people may also feel similar difficulties on the contrary. Translation of wetland related materials between Latvian and English/Russian/other Baltic languages is promoted by EIMS facilities and disseminated through the Internet. Though such a function can be placed in other part of Latvia, this is beneficial so that LWC is well known to the world, and this work can be done on the Internet by cooperation of volunteers all over the country.

3) On-the-job capacity building

EMC should accept at least two seconded staff from educational and administration sectors for around one-year rotation terms. One is for bringing up experts in nature observation program and the other to incorporate wise use concept in development administration.

4) Training and seminar

Due to geographic location, transporting facilities of the center should be fully utilized to bring participants to the center. When necessary, dispatch of lecturers and materials should be sent actively to requested places. Since field projects of WCP mainly consist of those targeted at water-related biotopes, conservation of dry lands should be achieved by training and awareness of forestry and agriculture sectors.

(5) Cost Estimation for Projects and Programs for WCP

The total cost for WCP is indicatively estimated at about 2.3 million LVL including O/M costs up to 2010. The cost for the EMC construction project is about 375,000 LVL including necessary indoor and outdoor facilities. The cost for the Biotope Conservation program which consists of 4 subprograms is about 796,000 LVL. The costs for the Environmental Research and Monitoring program and the Environmental Education and Public Awareness program are 166,000 LVL and 107,000 LVL, respectively.

4.2.2 Organization and Institution

(1) Wetland conservation functions of EMC

In EMC, the Wetland Conservation Plan is borne by the Management House and Information House. The former deals with ecosystem oriented approach and species oriented approach, and the latter is in charge of awareness oriented approach.

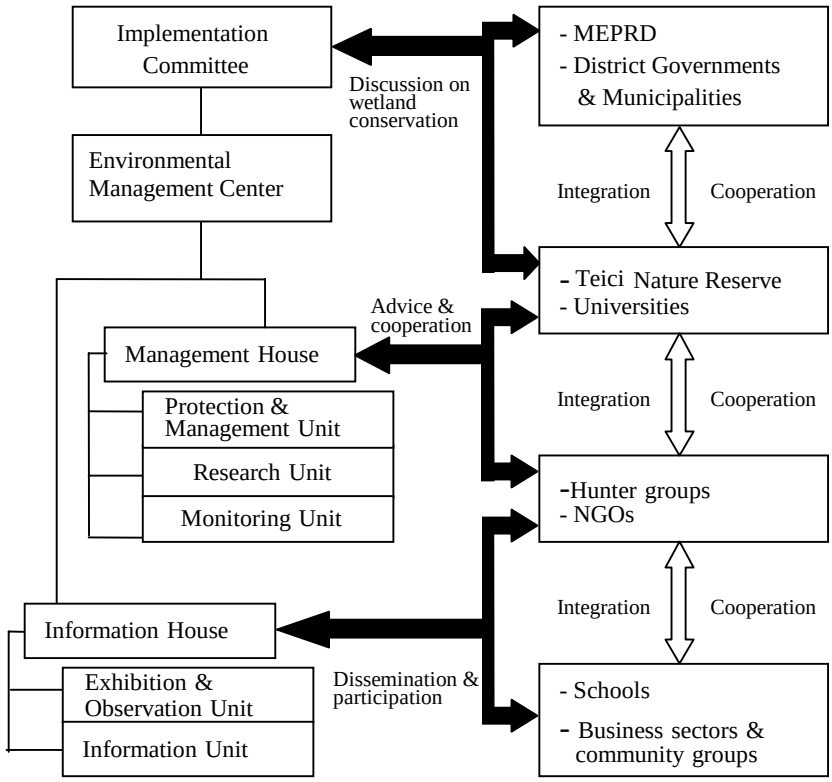
The Management House is composed of 3 sections, that is, the Protection and Management unit, Research unit and Monitoring unit. The Protection and Management unit deals with the Biotope Conservation program. Field activities are mainly entrusted to the local communities, and the EMC's administrator is in charge of contracts and negotiations. The Research and Monitoring unit literally deals with those activities mentioned in the Environmental Research and Monitoring program. The Environmental Education and Public Awareness Promotion program is borne by two sections of the Information unit in the Information House. The Exhibition and Observation unit is in charge of both indoor and outdoor education and training.

Construction and maintenance activities such as trimming of roadside trees for visibility improvement and construction of bog observation tower are entrusted to the Protection and Management unit in consultation with the Eco-tourism House. The Exhibition and Observation unit mainly targets at group visitors for educational purpose. The Eco-tourism House receives individual and small group tourists. The Information unit is for EIMS, and it compiles monitoring data into a database and dissemination. Website activities and publication are borne by this unit.

(2) Collaboration with other organizations

Because resources of EMC are limited, activities have to be promoted in close collaboration with relevant organizations. In any case of the above collaboration, especially when it is on voluntary basis, their responsibility should be made clear and

names of collaborators as well as the mode of their cooperation should be credited on the outputs. This is a key point for long-lasting cooperation.



Organizational Relations for Wetland Conservation

4.3 Application to Ramsar Wetland

4.3.1 Proposed Ramsar Site

The proposed site is internationally important as bog areas, habitats for waterbirds, and inundated grassland which is not represented in other Ramsar sites in Latvia. Since LWC fulfills the criteria, it is proposed to register those territories collectively as a Ramsar site (refer to Figure 4.3.1.) at the commencement point of EMP. Collective registration is necessary to prevent fragmentation of conservation areas. Only Barkava oak stand, however, is excluded from the Ramsar site because it has few wetland components in its biotope and fragmented from the main area. There are following merits for designation: 1) monitoring is obliged, 2) the result is shared worldwide by the Ramsar Bureau, 3) local people can easily understand the wetland values, and 4) meritorious for attracting tourists.

4.3.2 Action Plan for Application

(1) Adaptability of LWC to Ramsar criteria

Chapter 2 of the Ramsar Convention requests contracting parties to designate suitable wetlands for inclusion in a List of Wetlands of International Importance. Latvia is a signatory of the Ramsar Convention and three wetlands have been registered including neighboring the Teici nature reserve.

LWC satisfies the Criterion 1 as representative rare or unique wetland type, because existence of large inundated grassland can not be seen in other part of Latvia. LWC also satisfies Criteria 2, 3, 5, 6 and 8 on biological diversity. It supports 20,000 or more water birds and 1 % of the individuals in a population of one water bird species. Linked with the Teici nature reserve, another Ramsar site, conservation value of LWC is increased. Compared to bogs of surrounding areas that are no longer natural bogs due to intensive peat extraction, large high bogs in LWC is a typical biotope that retain high quality of naturalness. LWC is also characterized by containing most biotope diversities that are seen in inland areas of Latvia.

The present number of water birds is supported by fishponds. Before construction of fishponds, those areas were seasonally flooded wet meadows, and not suitable habitats for waterfowl. Probably, Criteria 5 and 6 had not been satisfied in the past. Dyke construction also prevented migration of fishes between the lake and rivers though it seems not a decisive impact on the fish abundance.

If no conservation measures are taken in LWC, Criteria 5 and 6 will not be satisfied because inundated grassland will lose its original vegetation by desiccation and cessation of mowing. Fishpond will also soon lose its function as good bird habitat. By implementing EMP, however, these problems will be solved and LWC will be able to accommodate more water birds. WCP will also serve to improving habitat for fishes and mammals.

(2) Adaptability of WCP to the main text of the Ramsar Convention

Table 4.3.1 indicates relevance of WCP with the main text of the Ramsar convention. All the relevant items of the main text are satisfied by WCP.

(3) Adaptability of WCP to the Ramsar Strategic Plan 1997-2002

The Ramsar Convention had been a treaty for waterfowl conservation. Presently, the Convention is putting more emphasis on overall wetland ecology including hydrological issues, and the directions are clearly shown in the Ramsar Strategic plan 1997-2002. The promotion of wetland wise use, raising awareness, reinforcing the capacity of institutions, increasing the number of Ramsar sites and mobilizing international cooperation are among emphasis points of the Convention to date. Those points are also emphasized in WCP.

It is a prerequisite for registration as a Ramsar site that the area satisfies the above-mentioned criteria and that a plan to promote the conservation of wetlands is formulated and implemented. For registration, the administrative authority (MEPRD for Latvia) fills out 'Information Sheet on Ramsar Wetlands', and submits it attached by appropriate maps to the Ramsar Bureau along with an official letter. Upon the receipt, the bureau starts internal procedure for its inclusion in the List of Internationally Importance, but it does not include screening process.

Table 4.3.1 Relevance of Wetland Conservation in LWC with the Main Text of the Ramsar Convention

Type of requirements	Relevant texts in the Ramsar Convention	Measures to be taken in the Plan
Establishment of Ramsar site	Article 2-1: Contracting Party shall designate suitable wetlands. Wetlands should be selected for the List on account of their international significance.	LWC satisfy criteria for Ramsar registration, and establishment of a Ramsar site is proposed.
International responsibility	Article 2-6: Contracting Party shall consider its international responsibilities for the conservation, management and wise use of migratory stocks of waterfowl.	International cooperation with countries on migratory routes is promoted through EMC activities such as 'Baltic Ramsar Center.
Planning	Article 3-1: The Contracting Parties shall formulate and implement their planning so as to promote the conservation of the wetlands included in the List, and as far as possible the wise use of wetlands in their territory.	This plan itself satisfies this condition. Wise use is emphasized in the rules of protected territories. Educational use of wetlands is among wise use measures.
Monitoring	Article 3-2: Contracting Party shall arrange to be informed at the earliest possible time if the ecological character of any wetland has changed, is changing or is likely to change as the result of technological developments, pollution or other human interference.	'Early Warning' is realized through monitoring program.
	Article 4-1: Promote the conservation of wetlands and waterfowl by establishing nature reserves on wetlands, whether they are included in the List or not, and provide adequately for their wardening.	Research is conducted in collaboration with other organizations, and educational activities are linked with other nature reserves.
Reporting	Article 3-2: Information on changes (in Article 3-2) shall be passed without delay to the responsible organization or government.	Environmental Information Management System includes reporting system.
Mitigation	Article 4-2: Where a Contracting Party deletes or restricts the boundaries of a wetland included in the List, it should as far as possible compensate for any loss of wetland resources, and in particular it should create additional nature reserves for waterfowl and for the protection.	This plan mainly aims at conservation on the existing site, and mitigation concept is not emphasized.
Research	Article 4-3: Contracting Parties shall encourage research and the exchange of data and publications regarding wetlands and their flora and fauna.	This is reflected in the research and monitoring activities.
Waterfowl augmentation	Article 4-4: Contracting Parties shall endeavor through management to increase waterfowl populations on appropriate wetlands (whether they are included in the List or not).	Improvement of fishponds and Lake Lubana as waterfowl habitat is a major part of the plan.
Training	Article 4-5: Contracting Parties shall promote the training of personnel competent in the fields of wetland research, management and wardening.	Capacity building of governmental sectors is emphasized.

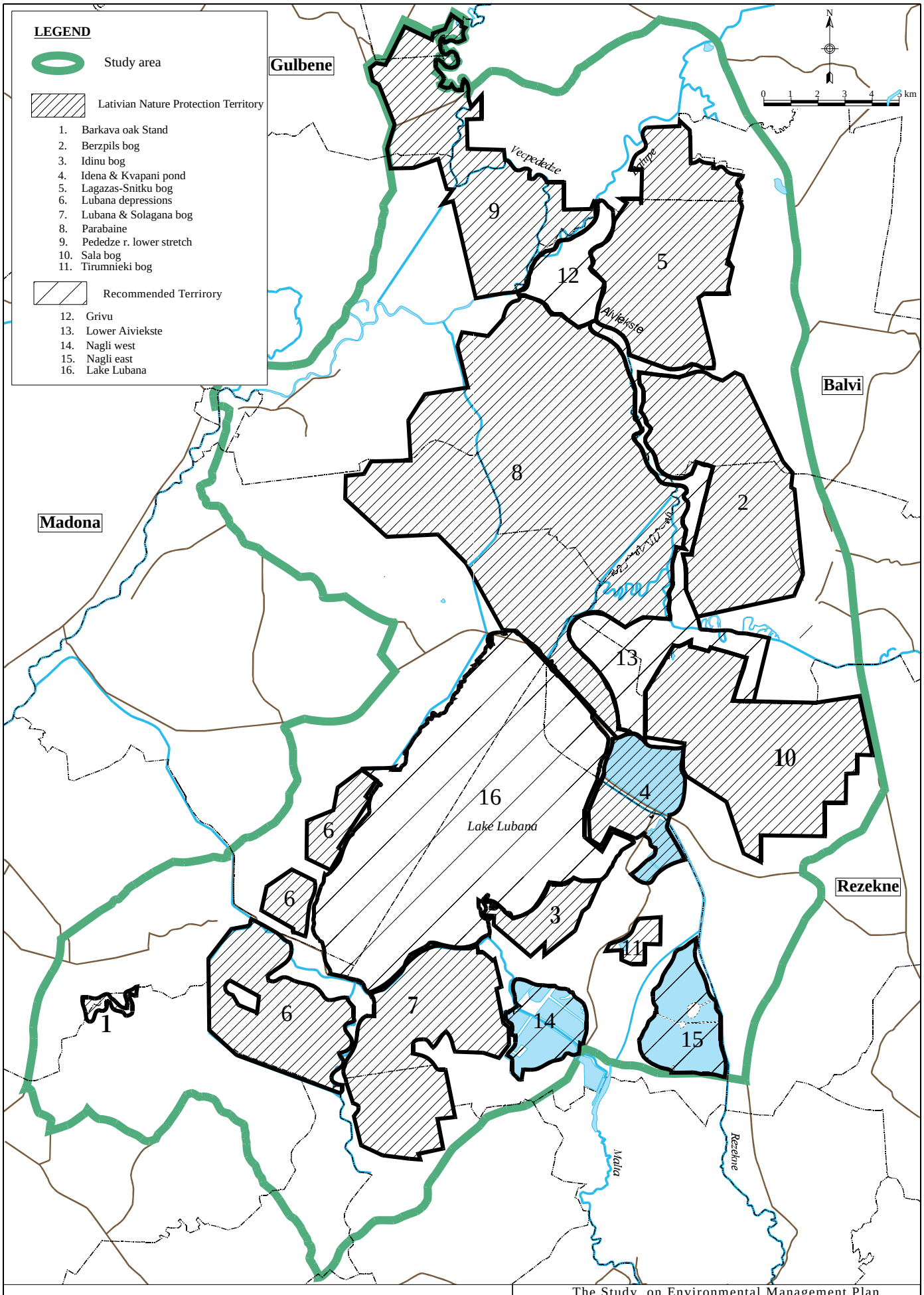


Figure 4.1.1 Proposed Biotopes for Conservation

The Study on Environmental Management Plan for the Lunaba Wetland Complex in the Republic of Latvia

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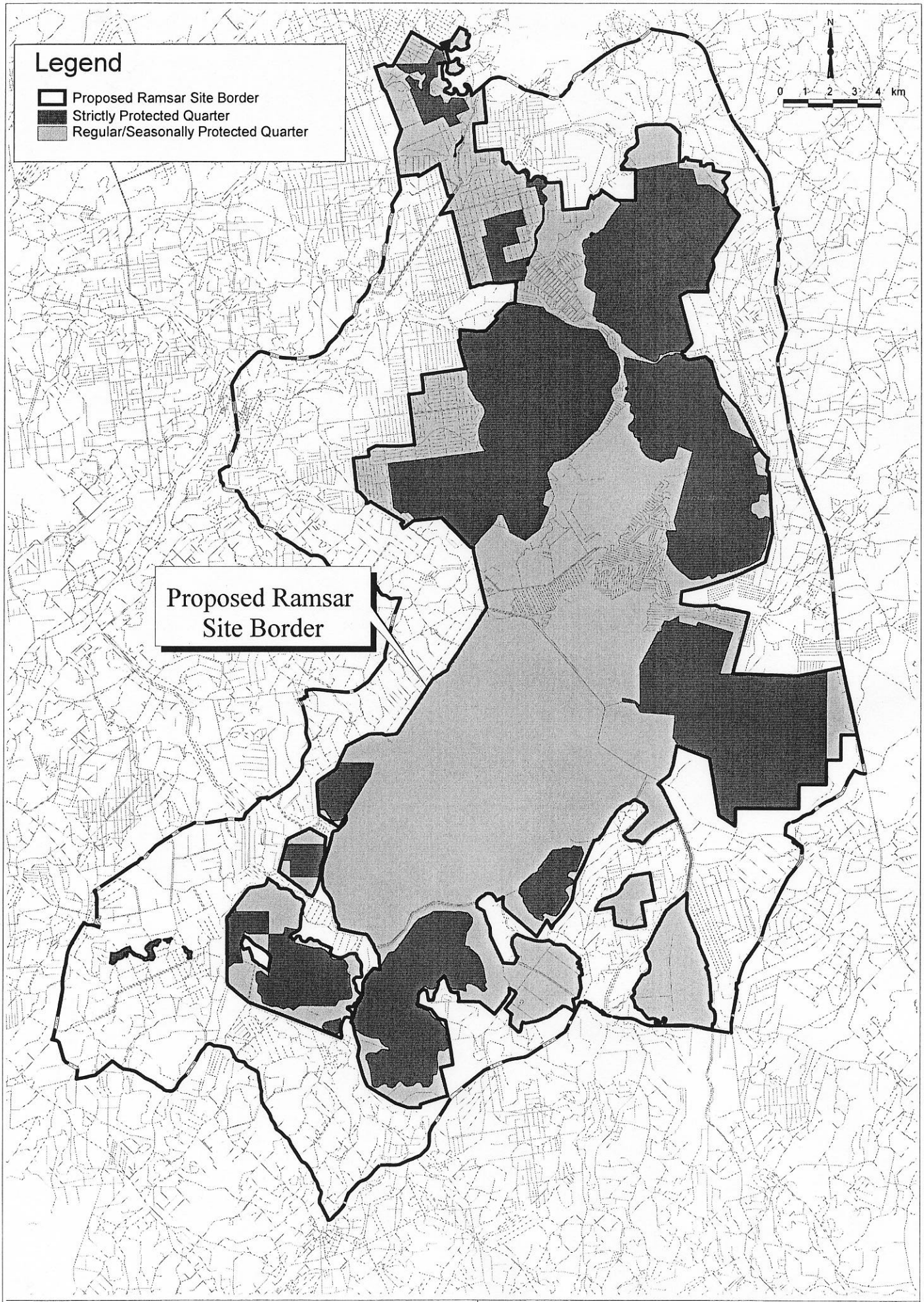

Figure 4.3.1 Proposed Ramsar Site

The Study on Environmental Management Plan for Lubana Wetland Complex in the Republic of Latvia

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CHAPTER 5 GUIDELINE FOR ENVIRONMENTAL INFORMATION MANAGEMENT SYSTEM (EIMS)

5.1 Overall Frame of EIMS

The objectives of EIMS are summarized into five categories: 1) decision-making, 2) monitoring, 3) environmental education, 4) public awareness, and 5) science promotion. The overall framework of EIMS is shown in Figure 5.1.1 with the EIMS objectives and outputs.

5.2 EIMS Working Plan

(1) Institutional setting for EIMS

The institutional framework of EIMS is under the jurisdiction of the management house of EMC. The director of the house is in charge of the analysis of policy-making entrusted by the directing board of the Implementation Committee of EMP. Three system engineers relevant to GIS data input, public awareness promotion, and environmental education promotion should be staffed to activate the evaluation/feedback and monitoring systems provided by EIMS. In addition, an ornithologist, a botanist, and a hydrologist will be manned in accordance with the conservation needs.

(2) Training for EIMS construction

1) Training for system engineers

The GIS/IT engineers of the local agencies have quite a potential to implement EIMS if financial resources are fully ensured. Engineering training courses for EIMS are formulated taking into consideration IT/GIS engineers' skills and potential. As the technical level of the local engineers is highly evaluated, the main focus of the engineering training should be placed on applications and improvement of EIMS for their convenient use. Training of the basic skills of GIS/remote-sensing and IT is rather a matter of supplemental courses. In other words, the main focus should be the role of EIMS and system engineers' roles in environmental management.

For environmental education and public awareness, the local skills and know-how require more experience. The systematic EE&T has to be fully taken into consideration to develop the training courses for the system engineers responsible for environmental education and public awareness. The principles and educational goals, the evaluation/feedback system through the Internet, and the formulation of the proposed EE&T activities should be the contents of the training courses for the system engineer in charge of environmental education. The system engineer for public awareness promotion will be required to master how to contact mass media, cooperate with the local NGOs, and teach the regulations relevant to nature protection. The eco-tourism development plan also should be fully understood by the system engineers.

2) Training for science-based analysts

The main topic of the training for a biologist, botanist, and hydrologist is the objectives of environmental management in LWC. They are not scientists but science-based analysts for environmental management. Just collecting data is not worthwhile. The objectives of EIMS include science promotion and decision-making. Science promotion will be completed only through strenuous efforts devoted by science-based analysts. The training should emphasize socialized communication skills required for the networking of scientific and administrative networking. Teici Nature Reserve can provide the training courses for a biologist and a botanist based on their scientific experience.

(3) Systems structuring for EIMS

Hardware and software necessary for EIMS are shown in the next table. All equipment can be procured in Latvia and will not require special knowledge for operation. The grand total for the hardware and software is about 74,000 LVL. Monthly salaries are 100 LVL/month for 6 engineers and analysts, 300 LVL/month for one director. The annual labor cost for EIMS is, therefore, 10,800 LVL/year.

Hardware and Software for EIMS

Item	Equipment
Hardware	PC, Network equipment, Scanner, Digitizer, Plotter, Copy machine, Uninterruptible power supply (UPS), etc.
Software	GIS software, Remote sensing, Basic software such as “Windows”, etc.

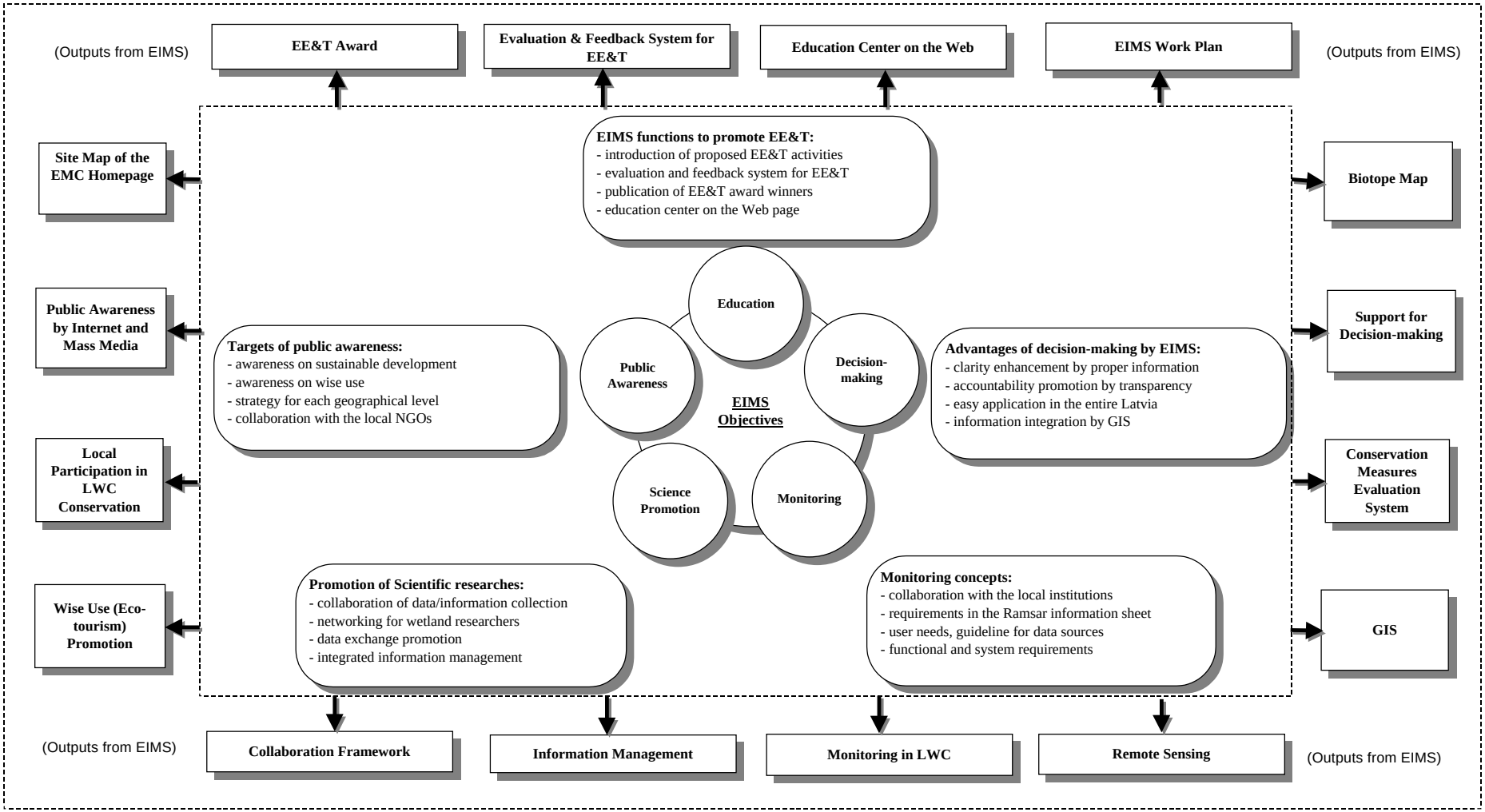


Figure 5.1.1 EIMS Framework

CHAPTER 6 ECO-TOURISM DEVELOPMENT PLAN

6.1 Eco-tourism Development Plan

6.1.1 Development Strategy

The eco-tourism is defined as "the promotion of environmentally sensitive tourism and the provision of facilities and environmental education so that tourist will visit, understand, appreciate and enjoy natural and cultural areas without causing unacceptable impacts or damage to their ecosystem or to local culture". Thus, the strategies of eco-tourism development can be set as follows reflecting the specific situations in and around LWC.

- sustainable natural resources management,
- local community driven development process,
- entrepreneurship promotion,
- full support by local government and public institutions,
- collaboration between public and private sectors,
- small scale eco-tourism and long-term benefits,
- supply-oriented management,
- differentiation and diversification of eco-tourism, and
- focusing on the most potential areas.

6.1.2 Eco-tourism Resources

Considering the viewpoints of wilderness and naturalness, uniqueness, beauty, applicability, availability, sustainability, accessibility, and safety of potential eco-tourism resources in LWC, the following 20 eco-tourism resources and activities are proposed so far to enhance eco-tourism in LWC.

Eco-tourism Resources and Proposed Activities

No.	Resources/Activities	No.	Resources/Activities
1	Boating and Angling along the Aiviekste	11	Bird Watching Tower
2	Taking Sauna and Cottage	12	Bird Watching in Kvapani
3	Beautiful Inundation	13	Campfire and Sports Activities
4	Watching Rare Broad-leaved Forests	14	Beach along Lake Lubana
5	Canoeing along the Pededze	15	Angling
6	Archeological Experience	16	Experience in Habitat Management
7	Walking around Teirumniku Bog	17	Animal Watching
8	Canoeing and Boating in Idena Canal	18	Agriculture Experience
9	Camping along the Idena Canal	19	Stork Watching
10	Lodge in Orenisi	20	Museum of Nature

6.1.3 Possible Scale of Eco-tourism Development

The estimation of the future number of tourists to LWC are made on the bases of two assumptions. One is the current number of tourists to LWC, and the second is the annual increase rate of the tourists. Based on these assumptions, the potential eco-tourists to LWC will be around 425 persons and it will increase to around 700 to 1,000 persons in 10 years

time provided that LWC is well improved in terms of information, advertisement, access to the site, tourism facility, and tourism management. Considering fairly increase of rural tourists in LWC, a scale of pilot project would be suitable for the eco-tourism development in EMP.

6.1.4 Eco-tourism Development Projects

Taking the locations and characteristics of eco-tourism resources into account, the Indrani and Lubana eco-tourism development project and the Nagli and Gaigalava eco-tourism development project are proposed as shown in Figure 6.1.1 and 6.1.2.

Building facilities should take a consistent strategy to differentiate the eco-tourism in LWC from others. Local-style, small, and nature-contained facilities should be obtained in LWC. The location of proposed facilities are grouped in two areas, namely in Lubana and Indrani township area and in Nagli and Gaigalava township area. The main facility for eco-tourism is accommodated in the Environmental Management Center (EMC) building together with other facilities like a wild life management.

The total cost for the eco-tourism project in Gaigalava and Nagli is about 242,000 LVL, while that for Indrani and Lubana is 279,000 LVL. Costs of the land acquisition is not included because the project sites are provided by either municipalities or local people who are willing to develop their sites for eco-tourism activities.

6.1.5 Planning and Implementation

The procedure of eco-tourism planning and implementation is shown in Figure 6.1.3. The purposes of planning are 1) entrepreneurship promotion, 2) improvement of eco-tourism activities and services, and 3) consistent monitoring of eco-tourism. Eco-tourism activities and services should be regularly improved by the systematic evaluation and feedback system to attract more visitors and prevent inappropriate activities for nature protection. As an administrative organization, EMC needs to monitor eco-tourism activities if they meet the regulations. Simultaneous promotion of the proposed fish hatchery development and angling promotion projects is recommended for more effective implementation of the eco-tourism development.

6.2 Organization and Institution

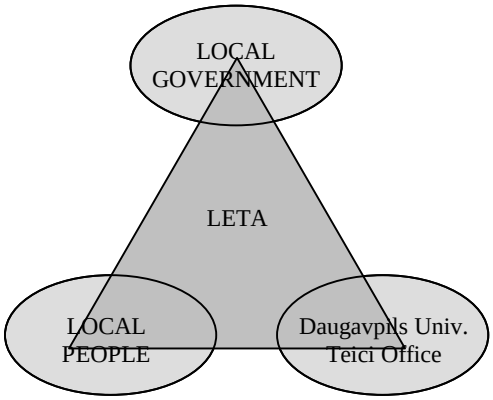
6.2.1 Role of Government and Environmental Management Center (EMC)

A number of obstacles need to be overcome by the help of the national and local governments. Bureaucratic system, insufficient educational opportunities, and unreasonable fiscal policies could hinder a healthy development of eco-tourism. Governments should facilitate economically viable entreprenourship providing financial, technical. regulatory, institutional, and physical supports for the private sector. Although the small scale is one of strategies, some initial investment is required for the eco-tourism development. Thus, the public sector investment is indispensable in the first phase and then, its operation and management should be gradually handed over to the private sector.

To avoid overlapping, conflicting, and contradictory measures for natural resources management, EMC is necessary to be established as an actual administrative and operative body under the Implementation Committee (IC) of EMP. For education and training of eco-tourism, EMC is proposed to prepare and arrange a variety of training programs in cooperation with the local eco-tourism associations. Under the supervision by IC, EMC should be a bridge of the administrative gaps among the townships concerned with eco-tourism development in LWC. For the success of attractive packaged eco-tourism activities, equal and arduous cooperation among the townships and businessmen should be formed by coordination efforts provided by EMC.

6.2.2 Proposed Organization for Eco-tourism Development

For the purpose of materializing eco-tourism development projects, it is proposed to form the LWC Eco-tourism Association (LETA). This LETA consists of interested local governments, interested local people groups supported by academic institutes. Possible local governments which are active in promoting these projects are Gaigalava, Nagli, Lubana, Indrani, and other interested townships. Possible academic institutes which will support the eco-tourism projects are DPU, the Teici State Nature Reserve Office and other interested institutions which are willing to support LWC eco-tourism from the academic capability. Such cross-sector cooperation can be depicted as the next picture. This LETA will be placed under the Eco-tourism House which is one of the functions in EMC.



Cross-sector Cooperation for the Projects

The function of LETA includes:

- coordination among local governments, local people ,and academic institutes,
- coordinating the construction of the facilities,
- planning project facilities and fund raising,
- managing eco-tourism activities for the project including sustainability,
- training of guides including language training,
- public relations giving advice to local people to start eco-tourism related business,
- coordinating with the Vidzeme Tourism Agency, the Latgale Tourism Agency, and other local governments, and

- coordinating with other sections of the Eco-tourism House in EMC.

These functions are all important for the implementation of LWC eco-tourism development. Figure 6.2.1 shows organizational relation between LETA and EMC with necessary financial procedure. Considering the people's capability, the crucial part seems to be mainly the fund raising necessary for preparing the facilities which require budgets to implement. LETA makes easier for the project receiving a soft loan from outside the country. Although Latvian government guarantees the return of a loan to a loan institution, it is essential to have a main implementation body which directly involves in the project. Then, necessary budgets are provided to LETA through the Ministry of Finance (MOF) and the district councils concerned, which are in positions to endorse and financially supervise the LETA activities. In order to carry out the two eco-tourism development projects, LETA is divided into two implementation groups consisting of interested household members such as farmers, fishermen, and foresters. The loan is repaid to the donors by MOF, since the eco-tourism projects will generate little profits at their initial stage.

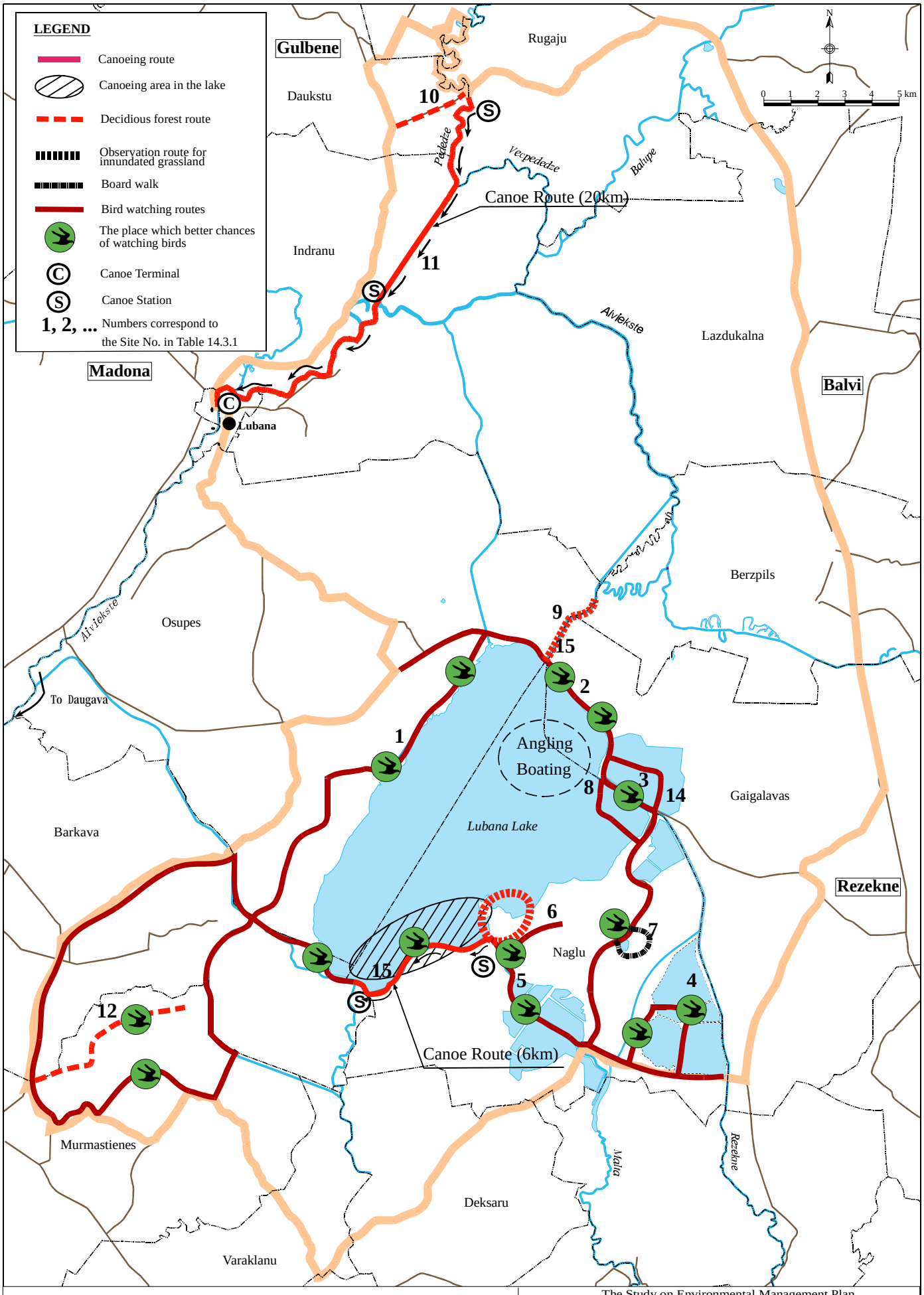


Figure 6.1.1 Proposed Eco-Tourism Activities

The Study on Environmental Management Plan
for Lubana Wetland Complex in the Republic of Latvia

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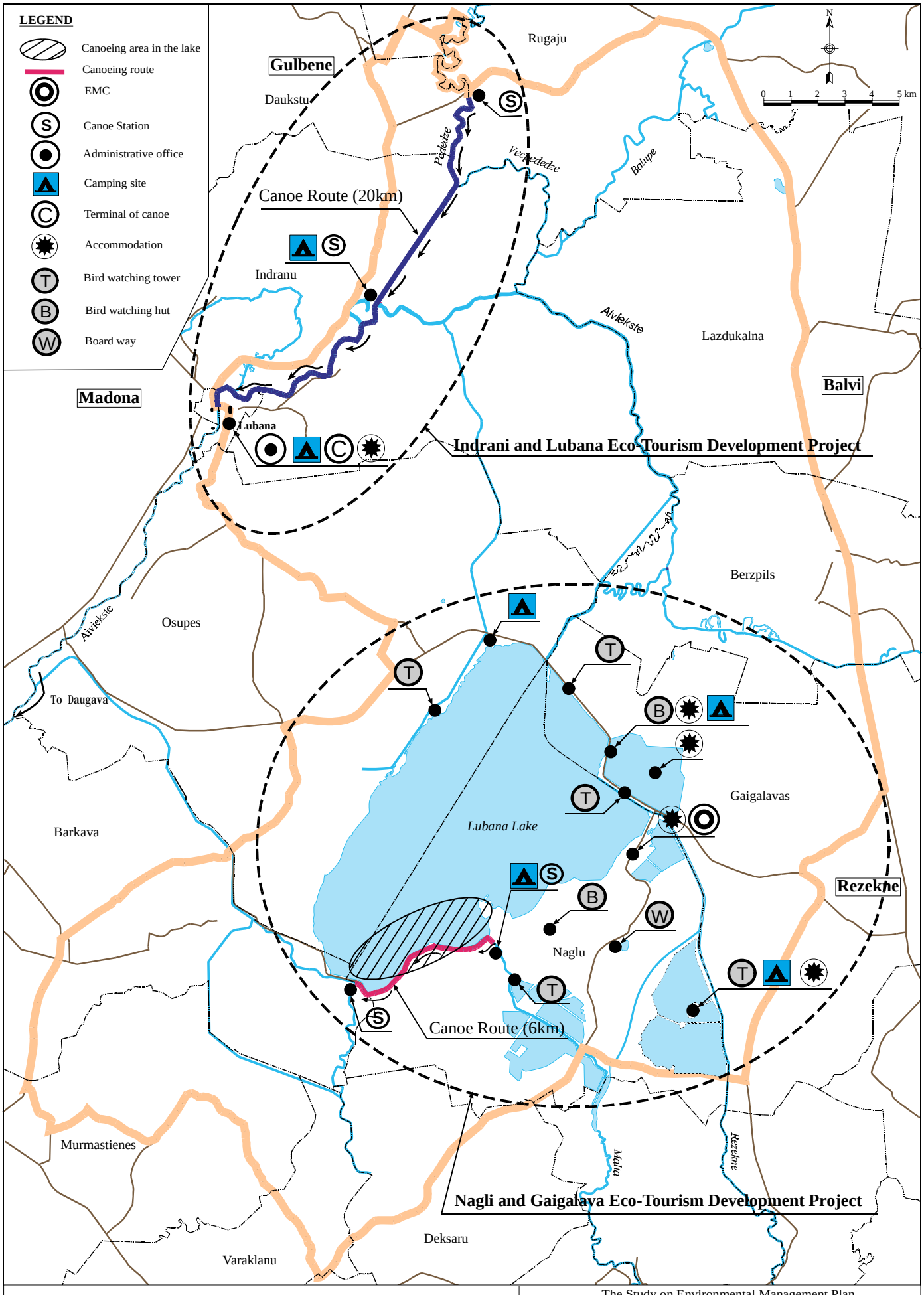

Figure 6.1.2 Proposed Eco-Tourism Development Project

The Study on Environmental Management Plan
for Lubana Wetland Complex in the Republic of Latvia

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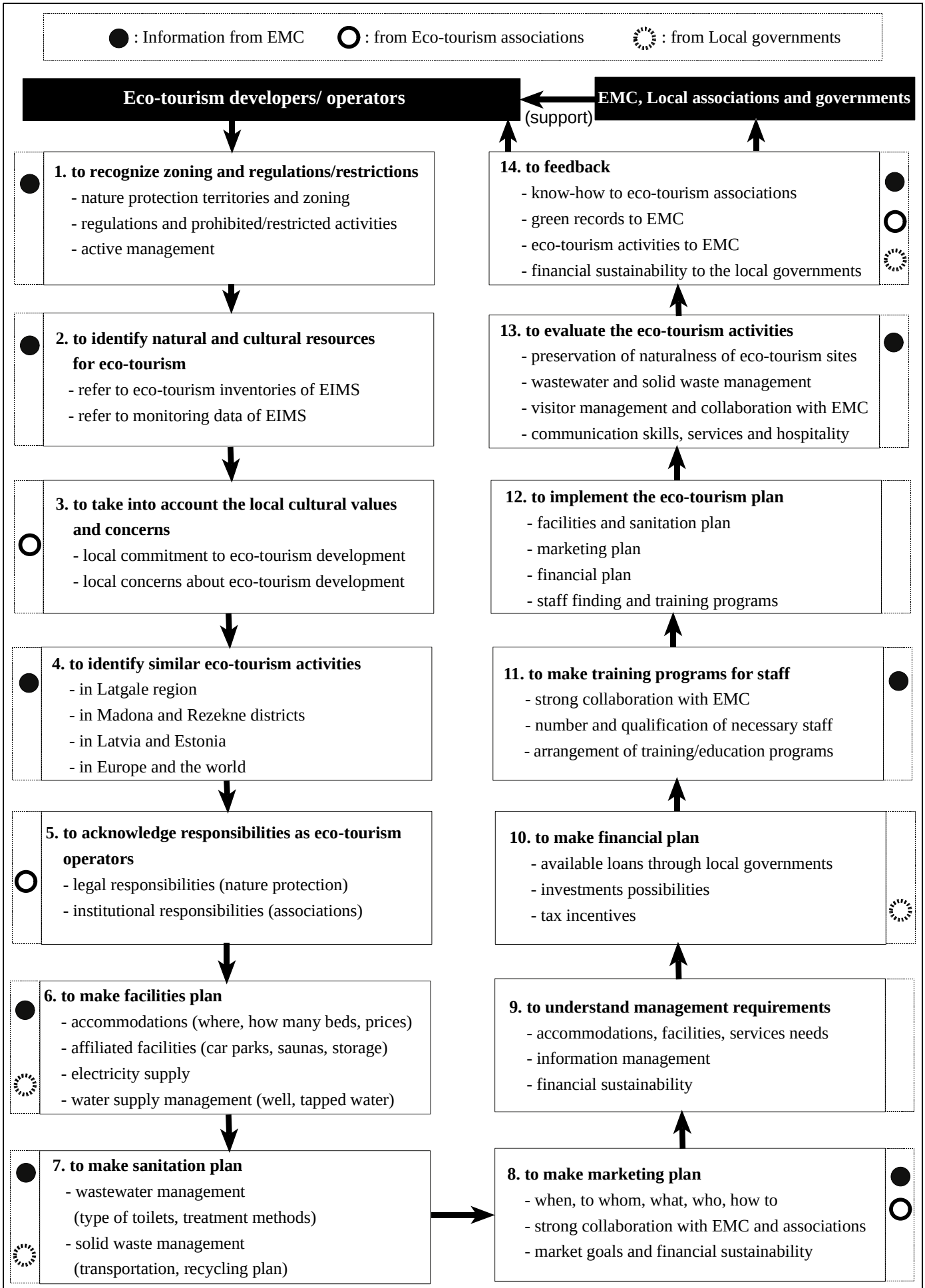

Figure 6.1.3 Eco-tourism Planning and Implementation Scheme

The Study on Environmental Management Plan
for Lubana Wetland Complex in the Republic of Latvia

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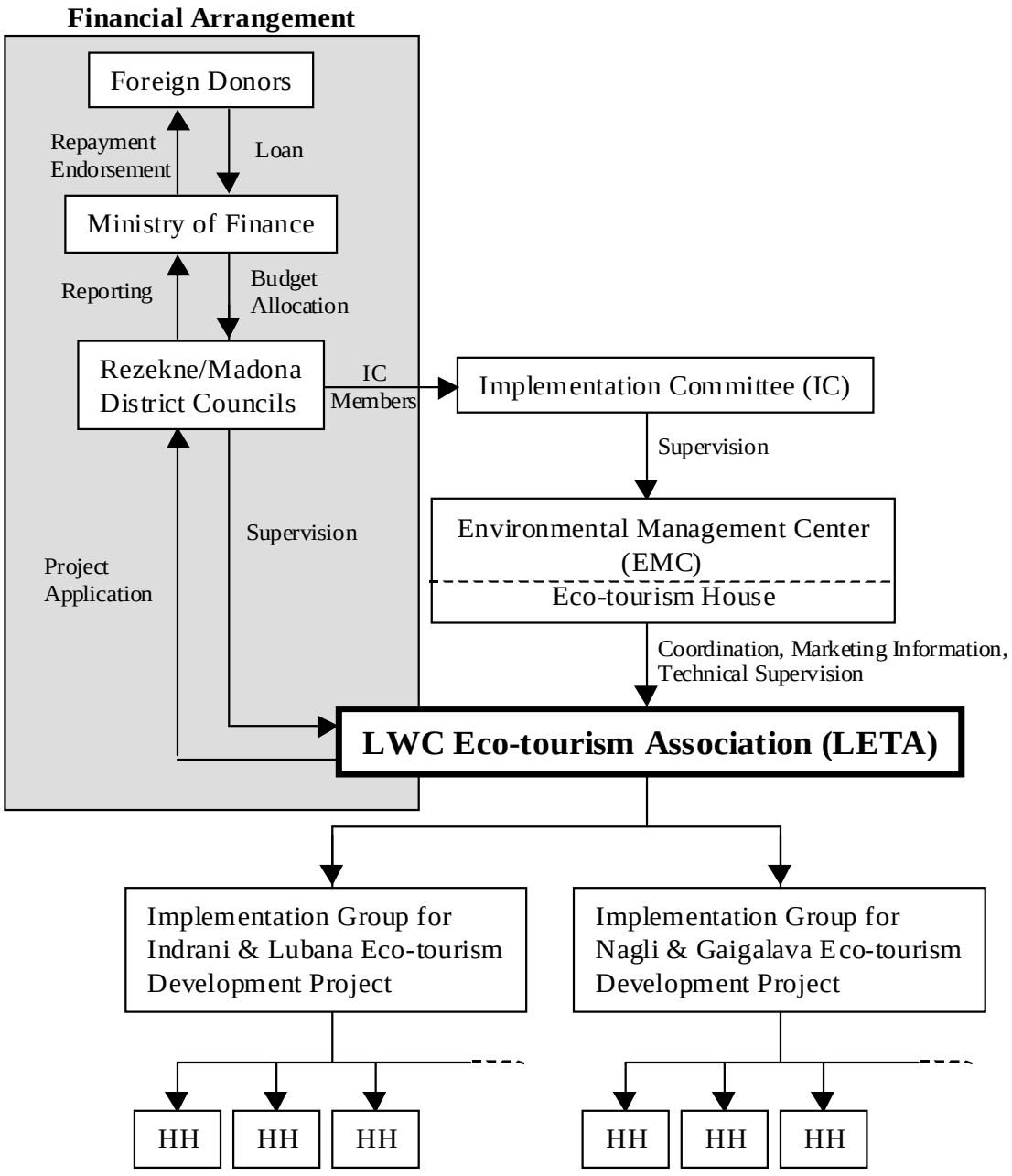

Note: HH - Local Household such as farmers, foresters, and fishermen

Figure 6.2.1 Organizational Structure and Financial Procedure for Eco-tourism Development in LWC

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CHAPTER 7 WATER LEVEL MANAGEMENT PLAN

7.1 Hydrology and Water Level Control

7.1.1 Current Water Level Control

(1) Operation rules for Lake Lubana

In 1992, the Aiviekste Land Reclamation System Administration (ALRSA) started review work and concluded with the "Lake Lubana Hydro-technical Building Operation Rule, Revised". The revised operation rule was approved and the operation activities based on this rule have been continued since August 1993.

According to the rule, water level at the beginning of the spring flood is to be kept at the level of 91.20m when the extreme flood with total volume of 2×10^{8} m^3 or more is forecasted. For this operation, the hydro-meteorological agency is scheduled to warn ALRSA about the possible flood with the forecasting period from February 1 to the end of spring floods. In addition, there is a regulation about special discharge for the northern wetland in the low water period. When the water level in the northern wetland becomes less than 91.20m, the clause 3.3.2 of the rule guarantees the water amount of $1.5 m^3/s$ for conservation of eco-system in the wetland.

The water levels of Lake Lubana and the opening heights at both the Aiviekste and Kalnagala gates have been recorded since 1983. Judging from the records, ALRSA operates the gates according to the operation rule. However, the water levels in winter season have been kept rather higher levels ranging from 91.7m to 92.2m. These higher water levels than rules' levels have been kept to reply to strong demands from fishermen in the lake.

(2) Operation rules of intake structure on the Malta river

The intake structure on the Malta river at Nagli was constructed in 1963, and the current operation rule titled "Exploitation rule of water-reservoir on the Malta river" has been applied since 1989. The intake structure consists of a weir with two water level controlling gates, intake gates, dykes on the Malta riversides, and a cross drain structure under the riverbed of the Malta river which was constructed for the drainage of the Rezekne river. The reservoir exploitation service is the responsible organization and it is staffed by the technical staffs of the Nagli fish farm.

The actual operation can not be clarified because the exploitation service, which is the "Nagli fish farm" actually, has not recorded the water levels. According to the inquiry survey to the responsible person of the Nagli fish farm, the service operates properly the gates properly based on the operation rule.

7.1.2 Water Level Simulation Model

The river and drainage system in LWC is divided into three subsystems from the viewpoint of water level simulation such as the northern wetland system, the Lubana Lake system, and the southwestern wetland system. The water level simulation model is developed in each subsystem to analyze the phenomenon of inundation in each block and to express the reverse flow between the upstream and downstream blocks.

7.2 Water Level Management Plan

The northern dyke system surely contributes to the flood mitigation. The proposed Water Management Plan therefore regards the existing dyke system as an essential given condition.

7.2.1 Required Water Level and Competitive Analysis

The principal purposes of the water level management plan are to sustain the current ecosystem, to maintain suitable water level for the activities of agriculture, fishery, and forestry, and to protect towns and villages against floods.

(1) Biotope conservation

Required water levels for Biotope conservation is summarized as follows.

Required Water Level for Biotope Conservation

Biotope category	Relation to the spring flood	Notes
1) Bog	Any flood (1/2, 1/5, 1/10 flood scale) is not acceptable.	Precipitation : only one source Surface water : not acceptable
2) Fen	Annual flood is required, but not necessary every year.	Precipitation : major source Surface water : keeping water level longer time Groundwater : keeping high level
3) Inundated grassland	Annual flood (1/2 flood scale) is required in early spring.	Surface water : major source Groundwater : keeping high level to prevent propagation of tree species
4) Forest	Annual flood (1/2, 1/5, 1/10 flood scale) is acceptable.	Surface water : shorter inundation period is desirable. Groundwater : necessary to keep low level (about 1m from ground).
5) Dry grassland and agricultural land	Annual flood (1/10 flood scale) is not acceptable..	Surface water : flood protection of 1/2 and 1/5 flood scale.

(2) Fishery and fish conservation

The focal point on fishery and fish conservation is to maintain desirable water level for fish in Lake Lubana within its required flood protection capacity. Thus, the following water level management in Lake Lubana for fish conservation and fishery development should be considered.

- to keep water depth of 2.5m or more to ensure fish wintering places,
- to make water level of 91.7m in Lake Lubana at least in autumn and winter seasons for spring flood protection,
- to keep water level same or increasing levels from March to June to provide favorable spawning and living conditions for fish, and

- to discharge the lake water continuously from the Kalnagala sluice for improvement of water quality in the southern part of the lake during spring season.

(3) Agriculture and forestry

An agriculture development plan is usually prepared taking a 5-year flood into account. So, the existing and proposed agricultural lands will require a lower water level of 1/5 flood scale. This means that control measures are required to the areas which would be inundated by the 1/2 and 1/5 flood scales. Although the forestry does not require a specific water level, the shorter inundation period is desirable for forestry.

(4) Flood protection and maintenance flow of Lake Lubana

It is necessary to consider required seasonal water levels from the viewpoint of flood mitigation, fishery development, and biotope conservation in Lake Lubana. Serious flood which damaged Lubana township and areas along the Aiviekste river in the 1920s and 1950s, have not occurred since the construction of the northern dyke system. The problem of the flood will not occur as long as the dyke system in Lake Lubana with a capacity for a 100-year flood exists. So, the water level of the lake is required low level of 91.75 or 91.20m in winter to protect the spring floods, though fishes require deep-water depth of 2.5m for wintering. While the water level of 94.5m starts to affect the bog area in the south west lakefront. This will require to keep the lake water level below 94.5m or to implement protection measures.

(5) Water level of fishponds

The Kvapani and Idena fishponds are leased to a private sector at present and there is no specific restriction for their use. These fishponds will be used as ponds for angling because various building works for the anglers are being advanced in Kvapani. The ponds can receive water in spring when the water levels of outside rivers and drainage channels are higher than that of ponds. So, there is no specific problem on water level management at present.

As for the Nagli fishpond, there would be no problems on water level management because of existence of water level control facilities. If there is a problem, it is a deterioration problem of facilities, since they were constructed in the 1950s. The lowering water level is easier in the Nagli fishpond through operations of drain sluices. On the other hand, the operation for high water level is limited to 97.0m or less because of the operation rule of the upstream reservoir water level in the Malta river.

(6) Water level of the southern wetland

The Idenu canal which runs along the southern edge of Lake Lubana from Idena township to the junction point of the Meirane canal, has an important role of a drainage canal in the southern wetland and a canal for an emergency spillway of Lake Lubana. There is a slide gate at the end of the canal which controls water level of the canal and its inundated area. The gate opens when the water level of the canal is higher than that of the Meirane canal as an outlet canal. However, the water level is usually lower than the Meirane canal, so the

gate is under closed condition. Some water remains in canal and downstream lowland possibly becomes the inundated grassland. It seems that this water level condition will not change in future without frequent operation of the control gate.

The Licina and Meirane canals, which were constructed and improved in the 1950s, provide enough drainage condition in the southern wetland. The riverbanks of these canals protect the riverside farmlands from flooding, and the inundation problems of the other two rivers are not serious at present. The agriculture, forestry, fishery, and ecosystem conservation sectors do not require specific water levels in this wetland.

(7) Competitive water level problem in the northern wetland

Inundated dry grassland

The dry grassland area, which is located along the right bank of the Pokratena river of one tributary of the Balupe river in the northeast of the area, could possibly be inundated by spring floods. The area, which is located between Ergala village and Lubana township along the Aiviekste river, also could possibly be inundated. If positive use of this dry grassland is proposed, some measures are necessary.

Dryness problem in the bog, inundated grassland and fen areas

The ditches accelerate the expansion of creating a dryness problem in the inundated grassland and fen after annual floods. The dryness problem also threatens the existence of bog area with drainage ditches and canals, which are dug in and around the area. These bog, fen, and inundated grassland areas with ecological importance characterize the wetland in LWC, and necessary measures should be taken for preventing the wetland from dryness. The Wetland Conservation Plan describes the detailed conservation measures of this problem.

Fish habitat conservation of the old Pededze river

Serious dryness problem also happens along the old Pededze river. The Pededze river flows into the new river section, which was excavated as one of the flood protection project to divert spring flood, and the old river section was completely closed by embankment of the new river section.

(8) Competitive water level problem in Lake Lubana

Fishery development and fish conservation

Fishery development and fish conservation require seasonal water level management. In autumn and winter, they require the water levels of 91.7m or more, and from March to June, they require the same or rather increasing water levels. The existing operation rules and actual operation fulfill these required water levels. However, it is necessary to consider countermeasures for the requirements of continuous discharge from the Kalnagala sluice for water, and of keeping the water depth of 2.5m or more for fishes wintering place.

7.2.2 Countermeasures and Cost Estimation

(1) Fish habitat conservation of the old Pededze river

Construction of a gate structure in the embankment of the Pededze river left bank at the junction point of the old Pededze river will be the fundamental solution. In addition to the gate structure, one small dam near Mierini village to keep water level high in the river section will be necessary. The amount to be diverted from the Pededze river should be estimated in consideration of water volume needed for the eco-tourism plan. The gate structure of slide type with 1m width and 1m height is proposed. The cost is estimated at 45,000 LVL indicatively.

(2) Preparation of wintering place for fish

Water depth of 2.5m or more is required in the lake in order to ensure the wintering of fish. The possible countermeasures for the wintering place are: heightening of dyke bank, excavation of lakebed, excavation of fish channel and excavation of canal system in the lake. As a result of study for these alternatives, alternative of the excavation of fish channel is the best solution for this problem from the viewpoint of the cost and the eco-system conservation. The following table shows estimated costs for each alternative. The cost for wintering place and habitat conservation mentioned above is included in the cost for wetland conservation plan.

Estimated Cost for Each Alternative

Alternative Measures	Estimated Cost (1,000 LVL)	Remarks
1) Heightening of dyke	31,450	Total length =50km, bank top width=6m
2) Excavation of Lake bed	2,032	80 ha, bottom level = 88.7m
3) Excavation of fish channel	384	Width=100m, Length=500-700m, bottom level = 90.0m
4) Excavation of canal system	6,100	Latvian plan

(3) Improvement of water quality in the southern part of the lake

Continuous outflow from the Kalnagala sluice is one of the effective solutions to improve water circulation. It revealed that about 17 m^3/sec of water can be discharged from the Kalnagala sluice even after ensuring 1.5 m^3/sec of river maintenance flow from the Aiviekste sluice. It is possible to manage by revising the existing operation rule of the lake. Therefore, there is no need to estimate special cost.

7.2.3 Proposed Operation Manual

For the revision of the existing manual, important points to be considered are the influence of desiccation to the northern wetland by the volume change of outflow through the Aiviekste sluice and the influence to fish conservation. Therefore, proposed manual is prepared taking note of the following points.

1) Utilize the Kalnagala sluice as much as possible to improve water quality.
2) Basically, the proposed operation rule is based on the existing one.

3) Discharge from the sluice should be the same amount as the inflow from two rivers as much as possible.

4) Water level should keep at the level of 91.75 m or more for the fish conservation.

7.2.4 Organization and Institution

(1) Proposed organization

It is proposed that the future organization for the water level management should be set up in the existing ALRSA as one section. ALRSA will receive requirements and provide information related to water level management and operation through the Implementation Committee (IC). ALRSA, which has long experience in water management in the LWC, will be requested to cooperate for conservation and development of LWC through the water level management services shown below.

- to collect and analyze hydrological and meteorological data,
- to forecast a flood on a temporal basis,
- to collect warnings and information about spring flood from the Meteo-hydro Agency in MEPRD,
- to evaluate requirements on water level management from EMC,
- to give a technical advice and information to EMC about flood and water level,
- to prepare an annual water management schedule based on the operation manual, current water level situation and the requirement from EMP,
- to decide necessary operation in case of emergency like extreme flood, and
- to operate gates and other facilities related to water level management.

(2) Transmission of data and information

According to the operation rule, ALRSA is scheduled to receive flood information from Meteo-hydro agency during the spring flood season from February 1 to the end of flood. However, ALRSA usually receives it after the spring flood season. The received information is not useful for flood control due to a transmission delay. Simultaneous transmission and sharing of flood information or warnings between the organizations concerned is indispensable especially in case of the extreme flood. In this connection, it is necessary to improve the existing system of transmission to a more speedy and easy one to access necessary data. The proposed organization chart is shown in Figure 7.2.1.

(3) Measures for capacity building on water level management

1) Data collection

ALRSA observes water levels at two sluices. However, there is no hydrological station in the river, which flows into the northern LWC and the lake except the Pededze, and Rezekne rivers. At least four hydrological stations are necessary to estimate the flood water volume in the Balupe and Ica rivers for northern wetland and in the Malta and Rezekne rivers. The automatic water level recording system on an electronic basis is recommendable. In addition, one thermometer is necessary to estimate roughly the starting

date of snow melting. The indicative cost for establishment of the hydrological stations is about 10,000 LVL.

2) Improvement of water level management facilities

Malfunctioning of gate leaf portion will be an obstacle for smooth operation especially in emergency. Irregular bottom elevation of culvert portions under the dyke will cause water leakage. The leakage water flows out with the dyke materials and consequently the dyke breaking might occur. The service life of the Kalnagala sluice has finished already, and the rehabilitation is indispensable for utilization of this gate to improve water quality in the lake. The total costs of rehabilitation of the Aiviekste and Kalnagala sluices are about 138,000 LVL and 145,000 LVL, respectively.

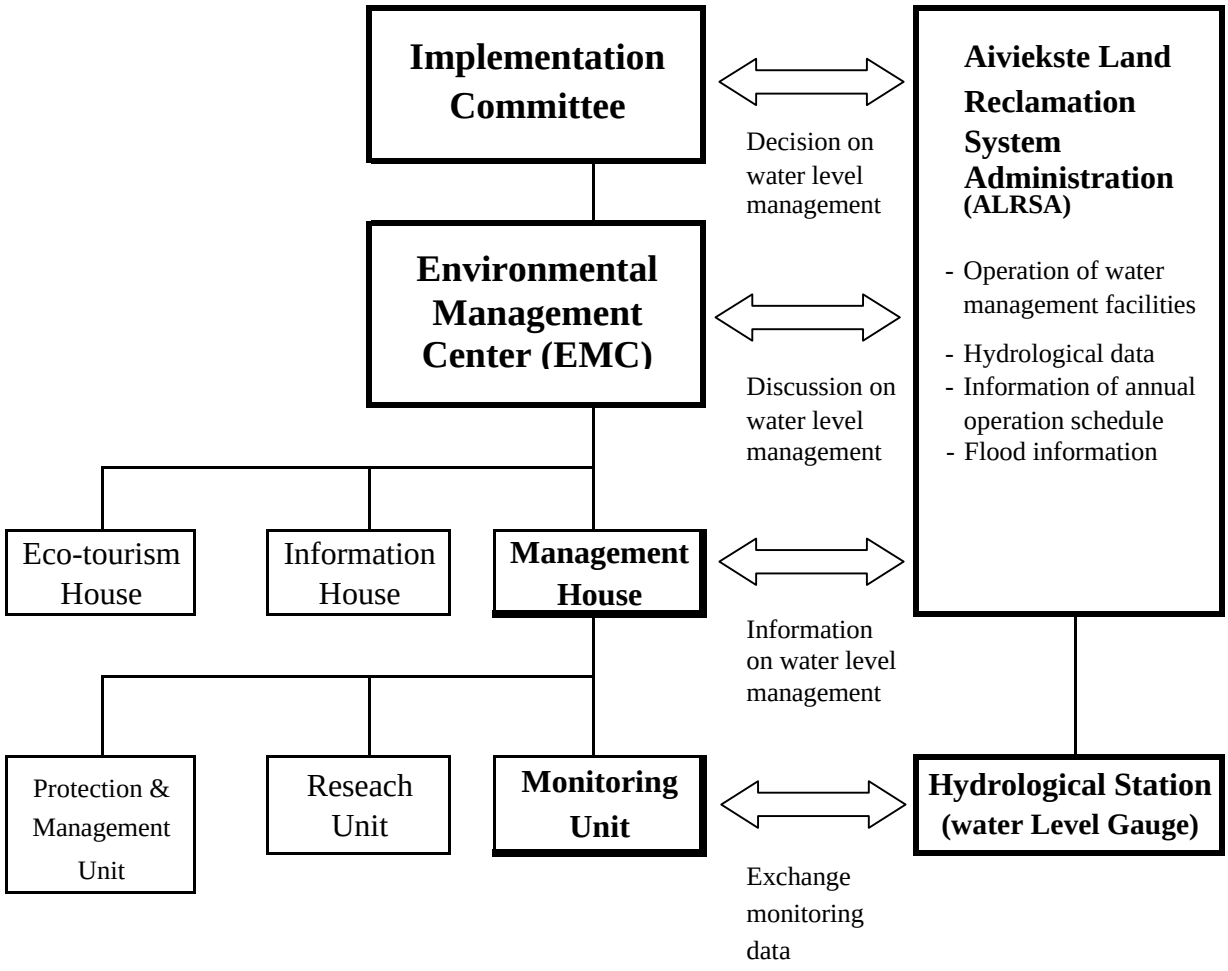

Figure 7.2.1 Proposed Organization for Water Level Management

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CHAPTER 8 ECONOMIC AND FINANCIAL ANALYSIS

8.1 Economic Evaluation and Financial Analysis

8.1.1 Proposed Projects and Programs

Several concrete projects and programs have been proposed within EMP framework by each sector. Based on the sector wise evaluation related to effectiveness, necessity, and technical feasibility, the 11 projects and programs (EMP Projects) are selected for EMP. The total cost including the initial cost, O/M cost, and physical contingency (15% of the initial cost) up to 2010 is estimated at 4.6 million LVL, indicatively.

Proposed Projects and Programs for EMP

(Unit: 1,000 LVL)

Name of Projects and Programs	Initial Cost	O/M Cost	Total Cost
I. Wetland Conservation Plan	***1,444***	***879***	***2,323***
1. Environmental Management Center Construction Project	375	105	480
2. Biotope Conservation Program	796	78	874
3. Environmental Research and Monitoring Program	166	248	414
4. Environmental Education and Public Awareness Program	107	448	555
II. Eco-tourism Development Plan	***521***	***393***	***914***
5. Indrani and Lubana Eco-tourism Development Project	242	171	413
6. Nagli and Gaigalava Eco-tourism Development Project	279	222	501
III. Fishery Development Plan	***414***	***227***	***641***
7. Fish Hatchery Development Project	315	156	471
8. Angling Promotion Project	99	71	170
IV. Water Level Management Plan	***293***	***9***	***302***
9. Aiviekste Sluice Rehabilitation Project	138	6	144
10. Kalnagala Sluice Rehabilitation Project	145	1	146
11. Hydrological Station Construction Project	10	2	12
Physical Contingency (15 %)	***401***	***-***	***401***
Grand Total	***3,073***	***1,508***	***4,581***

Note: O/M cost is the total cost up to 2010.

8.1.2 Result of Cost-Benefit Analysis

Economic viability of the EMP Projects is evaluated by Economical Internal Rate of Return (EIRR) with 40-year project period though the target year of EMP is 2010. The EIRR is estimated to be 30 %. This means that the EMP Projects are viable economically even though some parts of benefits of them are only quantified in monetary value and all costs of the EMP Projects are estimated.

Considering that sustainable environmental conservation and economic development in LWC are realized by local residents, a mechanism that most benefits should be distributed to local people in the long term would be necessary. In this sense, employment opportunity for local residents in and around LWC should be created such as nature guide for eco-tourism, business for eco-tourism activities, and rural tourism.

8.1.3 Financial Analysis

The initial cost for the EMP Projects consisting of those for design, construction, equipment procurement, and physical contingency is estimated at about 3.1 million LVL.

The O/M cost of them including training cost for staff from year 2001 to 2010 are estimated at about 1.5 million LVL. Total cost up to year 2010 is about 4.6 million LVL.

The EMP Projects are interdependent and the benefits of EMP are brought about by overall implementation of them. Therefore, cost recovery mechanism should be considered within EMP framework, not by each project and program. The projects on eco-tourism and angling could collect certain amount of fee for cost recovery, but the projects on wetland conservation and water level management plan do not recover the expenses by themselves. Only the projects on eco-tourism and angling can not cover the required revenue of EMP. Thus, the following financial sources should be additionally sought by the Latvian government due considering the importance of conservation of the precious wetland.

a) Governmental subsidy for Ramsar site: The governmental budget for the Ramsar sites may be subsidized to EMP of LWC in a regular basis after LWC is designated as the Ramsar site.
b) Special assistance for environmental program: The renovation/renewal of equipment may be applied to grant aid programs by national or international organizations such as LEPF, Fish Fund, LIFE Nature, and Global Environment Facility.

8.2 Implementation Schedule

8.2.1 Phased Plan

The EMP Projects were proposed as required measures to realize EMP. To implement the EMP Projects systematically and steadily, a stepwise implementation schedule, namely a phased plan, is required. Considering necessary time of capacity building for the implementation of the EMP Projects such as preparation of financial, technical, and human resources, and the consistency and linkage among the EMP Projects, a plan with three phases is proposed as follows:

- Phase I : Preparation period of the EMP Projects with design, procurement of equipment, construction, and civil works (year 2001 to 2003).
- Phase II : Commencement period of most of the EMP Projects with capacity building (year 2004 to 2007).
- Phase III : Full implementation period of the EMP Projects for sustainable operation after year 2010 (year 2008 to 2010).

These phases can be utilized not only for development of implementation schedules but also for checking the progress of the EMP Projects. Corresponding to the phases set above, the implementation schedules of the EMP Projects are prepared in Table 8.2.1. In these schedules, the stage classification such as design, equipment procurement, construction, training, and O/M were incorporated as shown in the patterned bar charts in the table.

8.2.2 Investment Program

The investment schedule during 2001 to 2010 based on the phased plan is shown below. It is important to note that O/M costs will be still needed after the target year 2010 to implement the EMP Projects continuously.

Investment Schedule (2001 - 2010)

(Unit: 1,000 LVL)

Items	Phase I (2001-2003)	Phase II (2004-2007)	Phase III (2008-2010)	Total (2001-2010)
Initial Cost	2,405	668	0	3,073
O/M Cost	124	848	536	1,508
Total Cost	2,529	1,516	536	4,581

Note: Initial cost includes the physical contingency in 15 %.

8.2.3 Financial Arrangement for Initial Cost

The financial arrangement for initial cost of the EMP Projects may be made with combination of the loan and grant scheme from potential international donors. Assume that the grant scheme is applied to the Environmental Research & Monitoring Program and the EIMS subprogram which provide only equipment, and other projects and programs apply for the soft loan, which is low interest rate and long repayment period loan scheme. Under the condition, total amounts of the soft loan and grant applied are allocated below.

Financial Application for Initial Cost

(Unit: 1,000 LVL)

Soft Loan	Grant	Total
2,797	276	3,073

In case that the Latvian government borrows initial cost through bilateral soft-loan under the following conditions to implement the EMP Projects, repayment schedule is shown as Table 8.2.2. From 2001 to 2010, only interest will be repaid at about 21,000 LVL/year. Then, from 2011 to 2040 total repayment amount with the principal and interest will be about 104,000 LVL/year.

- Interest Rate: 0.75 % per annum
- Repayment Period: 40 years including grace period 10 years

The O/M cost is basically born by domestic budget. Therefore, the total Latvian expenditure for the EMP Projects consists of the O/M cost and repayment of soft loan. Annual expenditure ranges from about 21,000 LVL/year to 445,000 LVL/year between 2001 and 2010, and 172,000 LVL/year on average. After the year 2011, annual expenditure ranges from about 220,000 LVL/year to 725,000 LVL/year and 361,000 LVL/year on average. Considering affordability of the expenditure for the EMP Projects, domestic annual revenue same as the annual expenditures should be at least required as shown in Table 8.2.2.

Figure 8.2.1 shows structure of financial arrangement for the proposed EMP projects. Although Latvian government guarantees the return of loan to a loan institution, it is essential to have main implementation bodies that are directly involved in the EMP projects, namely EMC, LETA, and ALRSA. Then, necessary budgets are allocated to the implementation agencies through the Ministry of Finance (MOF) and the district councils concerned, which are in positions to endorse and financially supervise the activities of the implementation agencies.

Table 8.2.1 Implementation Schedule of the EMP Projects

Type	Name of Projects and Programs	Phase I			Phase II				Phase III		
		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
I. Wetland Conservation Plan											
1	Environmental Management Center Construction Project	▨	▨	■	■	■	■	■	■	■	■
2	Biotope Conservation Program										
2-a	Bird conservation subprogram	▨	■	■	■	■	■	■	■	■	■
2-b	Mammal conservation subprogram		▨	■	■	■	■	■	■	■	■
2-c	Bog and inundated grassland conservation subprogram	▨	▨	■	■	■	■	■	■	■	■
2-d	Fish conservation subprogram		▨	▨	■	■	■	■	■	■	■
3	Environmental Research and Monitoring Program		▨	■	■	■	■	■	■	■	■
4	Environmental Education and Public Awareness Program										
4-a	EIMS subprogram		▨	■	■	■	■	■	■	■	■
4-b	Environmental Education subprogram		▨	■	■	■	■	■	■	■	■
II. Eco-tourism Development Plan											
5	Indrani and Lubana Eco-tourism Development Project			▨	▨	■	■	■	■	■	■
6	Nagli and Gaigalava Eco-tourism Development Project	▨	▨	■	■	■	■	■	■	■	■
III. Fishery Development Plan											
7	Fish Hatchery Development Project				▨	■	■	■	■	■	■
8	Angling Promotion Project		▨	■	■	■	■	■	■	■	■
IV. Water Level Management Plan											
9	Aiviekste Sluice Rehabilitation Project		▨	▨	■	■	■	■	■	■	■
10	Kalnagala Sluice Rehabilitation Project					▨	▨	■	■	■	■
11	Hydrological Station Construction Project	▨	■	■	■	■	■	■	■	■	■

Note: ▨ : Design, Equipment Procurement, Construction or Civil Works ■ : Operation and Maintenance (O&M) or Training

Table 8.2.2 Required Annual Revenue of the EMP Projects

(Unit: 1,000 LVL)

No.	Year	Expenditure				Minimum Required Revenue
		O/M Cost	Repayment of Loan		Total Cash Outflow	
			Principal	Interest Payment		
1	2001	0	0	21	21	21
2	2002	30	0	21	51	51
3	2003	94	0	21	115	115
4	2004	101	0	21	122	122
5	2005	116	0	21	137	137
6	2006	208	0	21	229	229
7	2007	424	0	21	445	445
8	2008	240	0	21	261	261
9	2009	180	0	21	201	201
10	**2010**	116	0	21	137	137
11	2011	214	83	21	318	318
12	2012	537	84	20	641	641
13	2013	261	85	20	366	366
14	2014	195	85	19	299	299
15	2015	116	86	18	220	220
16	2016	223	87	18	328	328
17	2017	424	87	17	528	528
18	2018	240	88	16	344	344
19	2019	180	89	16	285	285
20	2020	116	89	15	220	220
21	2021	218	90	15	323	323
22	2022	621	91	14	726	726
23	2023	306	91	13	410	410
24	2024	228	92	12	332	332
25	2025	116	93	12	221	221
26	2026	244	93	11	348	348
27	2027	424	94	10	528	528
28	2028	240	95	10	345	345
29	2029	180	96	9	285	285
30	2030	116	96	8	220	220
31	2031	214	97	8	319	319
32	2032	537	98	7	642	642
33	2033	261	98	6	365	365
34	2034	195	99	5	299	299
35	2035	116	100	5	221	221
36	2036	223	101	4	328	328
37	2037	424	101	3	528	528
38	2038	240	102	2	344	344
39	2039	180	103	2	285	285
40	2040	116	104	1	221	221
Total		9,209	2,798	547	12,553	12,553

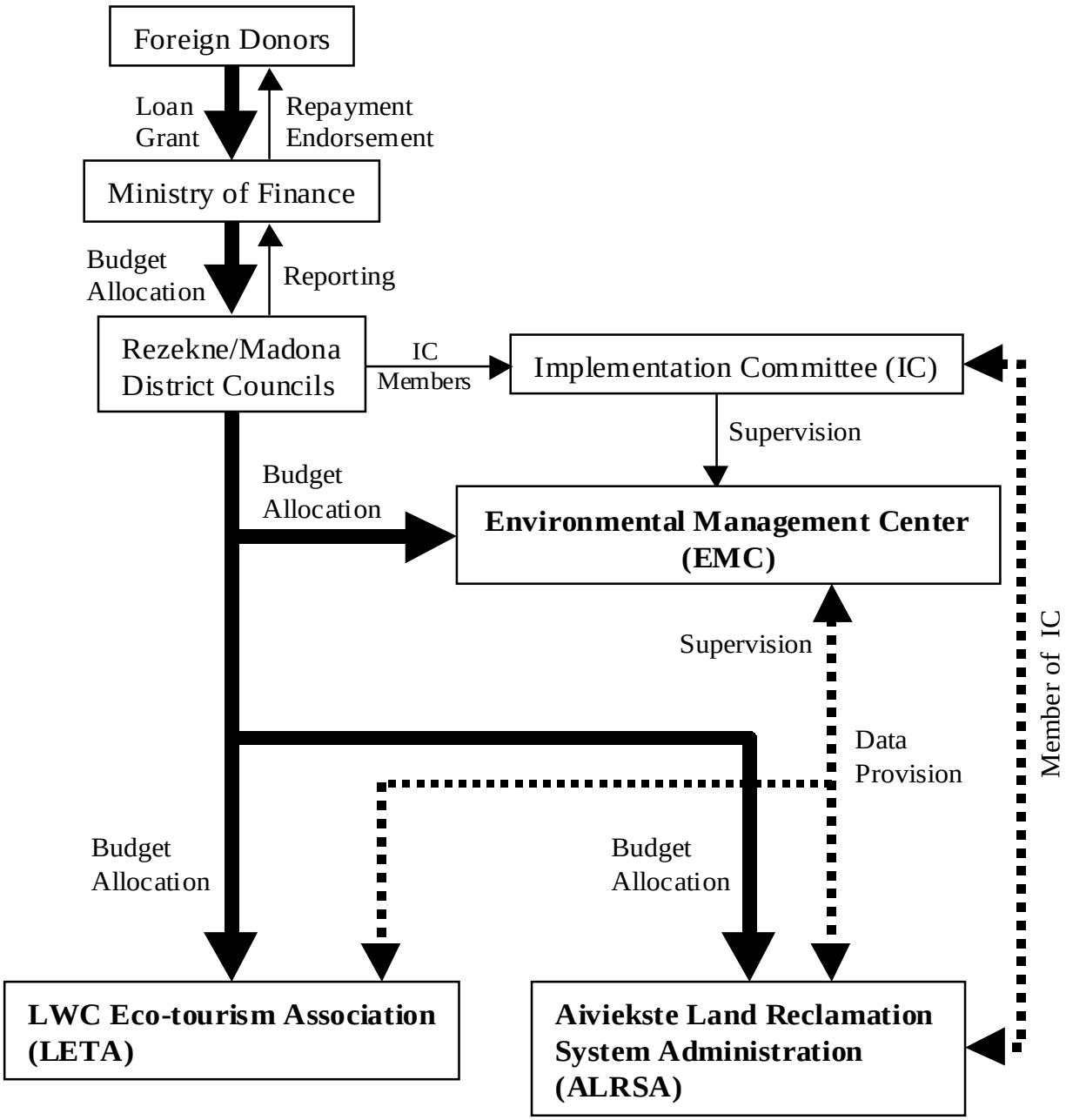

Figure 8.2.1 Financial Arrangement Structure for EMP Projects

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CHAPTER 9 RECOMMENDATIONS

9.1 Recommendation

(1) Regional development and land use

Three strategies are recommended for development in LWC, 1) small scale rural development, 2) multi sector development, and 3) eco-tourism and rural tourism promotion. Under these strategies, it is essential to make use of any resources in LWC to improve the living standard of the local people.

Socioeconomic levels represented by employment rate, wage and education level in LWC should reach the national average. In order to reach the economic growth with the nationally predicted rate in LWC, it is recommended to consider development projects at the regional or district level, regarding LWC as part of a larger project area. For example, further development in LWC can be carried out within the framework of the development plan for Latgale region prepared recently. Development directions in this plan such as rural tourism and information technology are to be expanded to LWC.

The recommended five land use strategies are 1) restriction on change of the existing land use pattern, 2) flexible and small scale conversion of the idle arable lands into forests, 3) harmonization of productive and recreational usage of water bodies, 4) building of small scale factories, facilities, and infrastructure, and 5) application of land use technologies friendly to local environment. The future land use planning of LWC should follow the proposed land use map, which is based on development potentials in the future as well as proposed land use appropriate for environmental conservation.

The already established land use situation should not be changed as much as possible, also preventing additional construction of large-scale facilities and infrastructure. It is not only to prevent damages to the wetland ecosystem of LWC, but also to guarantee the productive land resource to the owners. Idle arable land is to be flexibly converted between cultivated land and forest depending on economic profitability of the both industries. The agricultural and forest lands can be used not only purely for agricultural and forestry activities but also for rural tourism development based on the existing natural resources. In addition, water bodies such as Lake Lubana and fishponds should be managed so that they contribute to both commercial fishery and waterfowl preservation as eco-tourism object.

Since land in LWC is owned by different stakeholders such as private persons, private enterprises, the state and local municipalities, due agreement and compensation should be required where private land is planned to be converted to the protection area and even to different productive land, for instance from potentially arable land to forest. Therefore, the different stakeholders' interests on land use must be coordinated by providing local people with opportunities to participate in planning the concrete land use for LWC under the EMP framework.

An independent land use planning unit is recommended to be established for LWC. At the highest level, land use planning must be dealt with by a small committee of permanent members drawn from the local municipalities and agencies concerned with LWC.

(2) Fishery development

It is recommended to set a site specific concept on fishery in LWC as Lake of Pike. Pike and pikeperch must be the most important and symbolic fish species to be produced and conserved in LWC, because demand of ordinary freshwater fishes like carp species seems not to increase in near future considering people‘s general preference. This concept should be taken into consideration in relevant development and conservation activities, particularly for eco-tourism development. For the fishery development in LWC, the fish hatchery development project and the angling promotion project are proposed. The total cost for these projects up to 2010 is estimated at about 641,000 LVL including necessary facilities and equipment.

(3) Wetland conservation

The recommended strategies taken for wetland conservation of LWC are to emphasize the biodiversity, to preserve and conserve the wetland vegetation, to strengthen the function of forests, to manage game animals and birds through hunting, to promote eco-tourism for nature protection, and to focus on environmental education and public awareness. The total cost for the wetland conservation plan (WCP) is indicatively estimated at about 2.3 million LVL including O/M costs up to 2010.

As a project, the construction of the Environmental Management Center (EMC) at Idena is recommended to establish a base for actual implementation of the proposed programs. The biotope conservation program consists of four conservation subprograms for bird, mammal, bog & inundated grassland, and fish. The environmental research and monitoring program is also recommended for management purpose, especially for early warning and monitoring of natural environment as well as socioeconomic activities.

Since LWC fulfills the Ramsar convention criteria, it is recommended to register important biotopes of LWC collectively as a Ramsar site at the commencement point of EMP.

(4) Environmental Information Management and Education (EIMS)

Establishment of EIMS is recommended to accelerate decision-making, monitoring, environmental education, public awareness, and science promotion. The institutional framework for EIMS must be under the jurisdiction of EMC. The grand total for the hardware and software is about 74,000 LVL. In addition, the Environmental Education and Training (EE&T) Plan should be implemented in accordance with the directives and principles stipulated in the national policies on environmental education. It is advisable to integrate the EE&T plan formulated by EMP for LWC into the national guideline on education through MEPRD.

(5) Eco-tourism development

In order to attract the potential eco-tourists, LWC should be well improved in terms of information, advertisement, access, facility, and management. The strategies of eco-tourism development are recommended to be 1) sustainable natural resources management, 2) local community driven development process, 3) entrepreneurship promotion, 4) full support by local government and public institutions, 5) collaboration between public and private sectors, 6) small scale eco-tourism and long-term benefits, 7) supply-oriented management, 8) differentiation and diversification of eco-tourism, and 9) focusing on the most potential areas.

Taking the locations and characteristics of eco-tourism resources into account, two eco-tourism development projects are recommended. The Indrani and Lubana Eco-tourism Development Project includes facility construction of tourism information center, accommodation lodge, canoe terminal & station, camping site as well as information board & signposts. On the other hand, the Nagli and Gaigalava Eco-tourism Development Project requires eco-tourism services through EMC facilities, tourist facilities at Kuvapani and the Orenisi island, observation tower/hut, camping site, board walk, canoe station, sanitation facility, and other necessary equipment. The total initial cost for the eco-tourism project in Gaigalava and Nagli is about 242,000 LVL, while that for Indrani and Lubana is 279,000 LVL.

For the purpose of materializing the two eco-tourism development projects, it is proposed to form the LWC Eco-tourism Association (LETA) consisting of interested local governments, interested local people groups supported by academic institutes. Possible local governments which are active in promoting these projects are Gaigalava, Nagli, Lubana, Indrani and other interested townships. Possible academic institutes which will support the eco-tourism projects are DPU, the Teici State Nature Reserve Office and other interested institutions which are willing to support LWC eco-tourism from the academic capability. LETA is to be placed in EMC.

Eco-tourism activities and services should be regularly improved by the systematic evaluation and feedback system to attract more visitors and prevent inappropriate activities for nature protection. As an administrative organization, EMC needs to monitor eco-tourism activities if they meet the regulations. Governments should facilitate economically viable entreprenourship providing financial, technical. regulatory, institutional, and physical supports for the private sector. The public sector investment is indispensable in the first phase, and then its operation and management should be gradually handed over to the private sector.

(6) Water level management

For fish habitat conservation, a diversion of river flow to the old Pededze river and an excavation of fish channel for ensuring wintering place are recommended. The cost is included in the proposed wetland conservation plan.

The actual operation of the current water level management facilities should follow the proposed operation manual which is prepared taking note of the required water level and the current operation rule.

Establishment of four hydrological stations are recommended to estimate the flood water volume in the Balupe, Ica, Malta, and Rezekne rivers. The indicative cost for establishment of the hydrological stations is about 10,000 LVL. As for the Aiviekste and Kalnagala sluices, the whole structure should be replaced. The total cost of rehabilitation of the Aiviekste and Kalnagala sluices are138,000 LVL and 145,000 LVL, respectively.

(7) Environmental management plan

The fundamental vision of the EMP for LWC is recommended to be **Wise Use of the Lubana Wetland Complex**, with such goals to attain this vision as conservation of natural environment and sustainable use of natural resources. The EMP area is recommended to be divided into three zones, namely NPZ, AMZ, and DZ. The environmental zone shows the direction and intensity of actual measures of the wetland conservation plan. “Preservation” should be a principal direction in NPZ, “Protection” and “Conservation” is in AMZ, and “Restoration” mainly in DZ.

Establishment of the Implementation Committee (IC) and the Environmental Management Center (EMC) is proposed for actual implementation of EMP for LWC. IC should be a management authority of EMP which deliberates, authorizes, and coordinates substantial matters related to EMP, and EMC is recommended as a site specific organization for actual implementation of EMP. These two organizations should be established before implementation of EMP because it will require a lot of preparatory works.

Initial cost of the EMP Projects consisting of those for design, construction, equipment procurement, and physical contingency is estimated at about 3.1 million LVL. The O/M cost of them including training cost for staff from year 2001 to 2010 are estimated at about 1.5 million LVL. Total cost up to year 2010 is about 4.6 million LVL. The financial arrangement for initial cost of the EMP Projects is recommendable to be made with combination of the loan and grant scheme from potential international donors. It is recommended that the grant scheme is applied to the Environmental Research & Monitoring Program and the EIMS subprogram which provide only equipment, and other projects and programs apply for the soft loan, which is low interest rate and long repayment period loan scheme. The O/M cost should be basically born by domestic budget.

The total Latvian expenditure for the EMP Projects must consist of the O/M cost and repayment of soft loan. Annual expenditure ranges from about 21,000 LVL/year to 445,000 LVL/year between 2001 and 2010, and 172,000 LVL/year on average. After the year 2011, annual expenditure ranges from about 220,000 LVL/year to 725,000 LVL/year and 361,000 LVL/year on average. Considering affordability of the expenditure for the EMP Projects, domestic annual revenue same as the annual expenditures should be at least required.

The Wetland Conservation Plan, the Eco-tourism Development Plan, and the Hydrological Station Construction Project could be priority projects among the proposed 11 EMP Projects considering their quick effect and urgency. It is recommended that the Fishery Development Project should be implemented in line with the overall development of the Latgale region, and the Aiviekste and Kalnagala Sluice Rehabilitation Projects be designed taking the basin's flood control plan into account.

9.2 Conclusion

The development of a comprehensive EMP for LWC is acutely needed, and it is justified by its ecological importance, the political and problematic background of LWC, and the strong intention of Latvian people concerned. LWC has been known as an important habitat for migrating birds including rare species, and the International Council for Bird Reservation identified LWC as an important bird area in Europe and recommended its conservation in early 1990s. It is natural that a movement to apply LWC for a Ramsar site arose among the concerned people.

EMP indicates the implementation program, the relation with the local development plans, and the environmental benefit of the local society. EMP leads the people concerned to contribute and participate in wise use of natural resources, and guides the direction of environmental conservation in harmony with regional development by giving common environmental goals and targets of LWC.

In accordance with the goals and strategies, EMP provides the following seven major functions in line with the envisaged outputs. All these EMP's functions are closely connected to each other.

a) Establishment of conditions for Ramsar site registration,
b) Biotope conservation,
c) Environmental information management and monitoring,
d) Environmental education,
e) Integrated water level management,
f) Eco-tourism promotion, and
g) Baseline for development and land use of LWC.

If no conservation measures are taken in LWC, Ramsar Criteria 5 and 6 will not be satisfied because inundated grassland will lose its original vegetation by desiccation and cessation of mowing. Fishpond will also soon lose its function as good bird habitat. By implementing EMP, however, these problems will be solved and LWC will be able to accommodate more water birds, also improving habitat for fishes and mammals. There are following merits for the Ramsar-site designation: 1) monitoring is obliged, 2) the result is shared worldwide by the Ramsar Bureau, 3) local people can easily understand the wetland values, and 4) meritorious for attracting tourists.

Based on the sector wise evaluation related to effectiveness, necessity, and technical feasibility, the 11 projects and programs (EMP Projects) are proposed within EMP framework. The EMP Projects are expected to bring about many kinds of environmental

and economic benefits. All the EMP Projects are planned to be interdependent and contribute each other to gain overall benefit of EMP effectively. Considering the correlation of the benefits, those benefits are synthesized to the conservation of biotope, eco-tourism promotion, and protection of birds and mammals.

The Economical Internal Rate of Return (EIRR) with 40-year project period though the target year of EMP (2010) shows about 30 %. Compared to interest rates ranging from 10 % to 15 % in the conventional economic analysis, the result means that implementation of EMP is viable economically.

As an overall conclusion, the proposed EMP could be justified in terms of social necessity and urgency, and the recommended projects and programs would be feasible and viable from technical and economic standpoints. So the projects and programs within the EMP framework should be implemented as quick as possible before the important wetland ecosystem in LWC is further degraded.