CHAPTER 9

CHAPTER 9 DIRECTIONS OF LAND USE PLANNING

9.1 Overall Frame

A schematic chart summarizing the overall frame of land use planning for LWC is shown in Figure 9.1.1. According to this chart, the following sections describe the frame components including approaches, strategies, and legal and institutional aspects as well as links among them.

9.1.1 Approach and Strategy

(1) Approach for land use planning

The goal of the National Spatial Plan, which is now under preparation for more detail, is to promote sustainable social and economic development of the state, to facilitate coordinated regional policy, to ensure environmental protection, to make a rational use of lands and natural resources, and to manage and protect cultural and historic heritage, creating preconditions for formation of effective network of settlements and infrastructure. The plan will be prepared with basic directions of environmental policy of Latvia. The plan could not contradict the Directives of the European Union concerning spatial planning, including the EU Directive on Environmental Impact of Certain Private & Public Objects (85/337/EEC) as well as the Economic Development Strategy of Latvia and other legislation documents. In making the Plan, the following basic principles are supposed to be observed:

Publicity: The planning process promotes participation of society and politicians and their initiative at the earliest possible stage, ensuring openness of information.
Comprehensiveness: The plan takes into consideration and coordinates different spheres of public life, promotes its development, and ensures a comprehensive approach to problem solving.
Functionalism: The plan takes into consideration the existing functional connections between sectors and regions without disturbing or disarranging them.

Moreover, the plan should fit into a united planning system that specifies distribution of responsibility between the state and municipalities toward decentralization. The state is responsible for basic issues of environment and health protection, and for guidelines on improvement of land use planning of municipalities. In land use planning, local municipalities including towns and townships are responsible for local environment and their administrative area, and balance private and public interests at the area. Duly observing the goal and basic directions on the national-level land use planning, the following approaches for land use planning in LWC are proposed:

1) Planning for local people's welfare:

The local farmers, lumbermen, fishermen, and other land users that depend on the land are major focuses of land use planning. Local acceptability is most likely to be achieved by "bottom-up planning", where problems are identified and initiatives arise at a township level. However, the support of key people who can lend political credibility and agencies that have the resources to implement the plan is equally essential.

2) Protection against adverse impacts of introduced technology:

Land use planning is a means of introducing new technology such as agronomy, sylviculture, livestock husbandry, agro-forestry, and other means by which land is used. This, in turn, may have social and environmental impacts that must be assessed and mitigated in the planning process, as early as possible.

3) Planning with an integrated manner:

Land that is suitable for farming is usually suitable for many other competing uses. So land use planning has to integrate information about the suitability of the land, the demands for alternative products or users, and the opportunities for satisfying those demands on other land available at present and in the future. And land use planning has to integrate with the established legal and institutional framework.

4) Planning based on land resource information:

Capital, labor, management skill and technology can move to where they are needed. On the other hand, land resources are fixed, and different areas present different opportunities and different management problems. Land use plans define the distribution of land selected for the specified objectives. Accurate information about land resources is, therefore, essential to land use planning.

(2) Strategies of future land use

Considering the future land use in LWC, it is essential to observe the existing national and regional goals together with the above-mentioned approaches. The national goals stress rational use of nature resources, and management and protection of nature, which are quite suitable to the land use in environmentally important lands like LWC. LWC has unique and important wetland ecosystems, but with different issues related to local economic activities and environmental protection that should be regarded as one whole problem. Therefore, the area deserves a special attention within the frames of local land use. While determining the land use, there are important aspects to be regarded. One is the proportion of the determined form of land use to the total area, while another is lands with special conditions or location that should be reserved for specific goals. The second aspect should be emphasized in planning the future land use for LWC, because of its specific necessity of ecological conservation. Taking into account these key factors for land use planning for LWC, the following five land use strategies with implication on its regional development and wetland conservation are established:

1) Restriction on change of the existing land use pattern:

If the existing land use pattern is changed in such ways as conversion of forests, swamps or water bodies into agricultural land and other artificial usage, the whole ecosystem of LWC has to be basically affected because of spatially and physically close connection among the existing land uses. Therefore, land use change of a large scale should not be permitted in LWC in principle. Especially, any land use conversion of the proposed protected area are not allowed at all. In the same context, the existing marshes and bogs should remain for the future opportunity of potential profitable usage, because these have been formulated in a long ecological history and have kept naturalness attractive to visitors.

2) Flexible and small scale conversion of the idle arable lands into forests:

Some parts of area categorized as agricultural lands are not under active cultivation due to lack of product market, no profit in production, low level of soil fertility, poor drainage system or little cultivation manpower. The idle arable land is depicted as in Figure 9.1.2. These idle lands should be used not only for agriculture but also forestry, depending on the economic situation. An extent of conversion between agricultural land and forest can be determined comparing a mid-term profitability of the both sectors. When forestry products become much less profitable than agro-products in the future, some afforested area might be returned to farm lands.

3) Harmonization of productive and recreational usage of water bodies:

The water bodies such as Lake Lubana and the existing fish ponds are fishery production area, at the same time important potential area for recreational usage in eco-tourism and rural tourism development in LWC. Therefore, parts exclusively for fishery products or recreational usage and for multi-usage of the both should be demarcated harmoniously taking due consideration of the fishery profitability, tourists' interest and demand size, as well as impacts on water-front scenery and fish breeding. Thus, this harmonization must be also flexible depending on the potential markets of fishery products and tourism.

4) Building of small scale factories, facilities, and infrastructure:

For the economic development for the local society's well-being as well as for financial ground for natural conservation, agriculture-, forestry- or fishery-based processing factories will be profitable. These also have a possibility to offer processed goods as food and souvenirs to potential tourists. For promotion of eco-tourism and rural tourism, tourist facilities and minimum infrastructure have to be constructed or improved. Besides, water control facilities such as sluices, pumping stations, drainage canals have to be rehabilitated or constructed. But all of these should be in a small scale, only needing limited area, using the existing facilities as much as possible. In particular, additional construction of inundation control facilities should be implemented only in the Development Zone (DZ).

5) Application of land use technologies friendly to local environment:

Whether the products of each primary industry are traditional or non-traditional, environmental technologies including mixed or rotational cultivation, anti-erosion farming, agro-forestry, organic farming, sustainable and managed feeding in fishery are strongly recommended to be actively applied to productive land use fields. It is because such environment-oriented products can be a feature of LWC to develop new markets, and because the Active Management Zone (AMZ) surrounding the Nature Preservation Zone (NPZ) has a buffering function to ensure the wetland ecology in LWC.

9.1.2 Evaluation of Land Capability

LWC has been reported to be generally suitable for agriculture from both topographical and soil fertile points of view. And the existing forest land in the area has become appropriate for intensive forestry activities because of the past soil rehabilitation and work road construction. Here, land capability of LWC is reviewed especially for agricultural sector as it is spatially influential to the future development land use in LWC. Slope and soil depth are used to review land capability of LWC, applying them to the international standard classification as below.

Land Capability Classification for Agriculture

Soil Depth / Slope	Deep (>90 cm)	Moderately Deep (50~90 cm)	Shallow (20~50 cm)	Very Shallow (<20 cm)
Gently Sloping (<7^0)	C1	C1	C1	C1/P
Moderately Sloping (7^0~15^0)	C2	C2	C2/P	P

Source : Watershed Management Field Manual : Watershed Survey and Planning, FAO, 1990

Notes : C1=Cultivated land requiring no or few intensive conservation measures such as contour cultivation, strip cropping, vegetative barriers, rock barriers and, in larger farms, broad base terraces;

C2=Cultivated land needing more intensive conservation such as bench terracing, hexagon, convertible terracing for the convenience of four-wheel tractor farming. The conservation treatments can be done by medium-sized machines; and

P =Pasture. When the land is too wet, zero grazing should be practiced. Rotational grazing is recommended for all kinds of slopes.

In LWC, Glacigenos moraine loam and sandy loam deposits lying below are irregularly covered by limnoglacial deposits (sand, aleirit, clay), as much as by augshpleistocena and holocena deposits and peat. Its thickness is 1~4 m, maximum is 8 m. Relief of the plain is flat (mostly less than 1^o), and in some places is crossed by gently sloping hills and continental sandhills. Therefore, the area can be mostly classified into C1 where land is suitable for agricultural cultivation even without conservation measures such as soil erosion controls.

On the other hand, only 50~60 % of the arable land is now under actual agricultural activities in the four districts surrounding LWC. This high proportion of idle land results partially from the fact that there are large areas of low-quality boggy and marshy soils with peat. The poor soils had been forced into production before independence and parts have never come back into agricultural production. The share of acid soils requiring liming has increased, and some soils also contain insufficient natural phosphorus. The improvement of soil requires large investments. In addition, improvement of drainage situation is

necessary for some arable lands. For instance of Balvi district with the drained land occupying 66% of the total district area, ratios of the drained lands in a good technical condition, on average and unsatisfactory are 68 %, 15% and 17% respectively.

9.1.3 Legal and Institutional Framework

There may well be a long time gap between land use planning and actual implementation for financial, bureaucratic and political reasons beyond the control of the planner. The responsibility for putting the plan into effect rests with the decision-maker, implementing agencies, and the local people of LWC. Common pitfalls in institutional aspects of land use planning are:

- Underestimation of the time and amount of information needed to ensure the comprehension, participation and satisfaction of both the people and the local municipalities, especially in the cases of more socially-oriented activities like cooperatives and credit for small farmers,
- Starting new investment-oriented projects (roads, soil conservation works, tree planting) without building support institutions and following up earlier projects and programs, and
- Attempting to conserve land by taking out of production farmland or under grazing without making a compensatory increase in employment in other sectors.

In order to prevent these pitfalls and to implement the land use plan smoothly for LWC, the following legal and institutional framework should be duly considered.

(1) Policies to provide implementation incentives for land use

When a financial analysis from the farmer's point of view shows the land use to be privately advantageous, the use is likely to continue but may be socially damaging sometimes. Policy changes and incentives will be needed to make a socially desirable kind of land use, such as conservation farming, equally advantageous to the farmer. Similarly, a financial analysis may demonstrate that farmers do not have an incentive to produce a surplus for sale. If the government requires increased production, a change of pricing policy may be an effective way to provide incentives to achieve it.

The central or local governments may use incentives like grants, subsidies, food-for-work programs, tax benefits and public recognition, and may introduce regulations that require compliance. Where the incentive of ownership is not available, subsidies and/or legal coercion could be used to close the incentive gap.

(2) Legal and financial background for land use planning

According to the Law on Spatial Development Planning of Latvia, which was adopted on October, 1998, land use planning in Latvia is to be carried out, as such:

- Local governments of districts, state cities, towns and townships shall prepare land use plans of their administrative areas,
- Central or regional land use programs of higher level shall be observed when producing local land use plans of lower levels, and
- Land use plans of central, regional and local levels shall be prepared in accordance with the relevant development programs.

And the financial arrangement for land use planning is to follow the procedures as below:

- Financing for land use planning being the necessary expenses of the local municipalities shall be allocated in their budgets,
- For facilities of land use planning in the annual state budget, a state target grant is envisaged for co-financing of local municipality land use planning, and
- The Cabinet of Ministries determines the allocation procedure of the state target grants for preparation of local municipality land use plans.

(3) Legal background for ownership of protected areas

LWC includes nature protection areas designated in accordance with the Law on Specially Protected Nature Territories issued in 1993. The legal powers for control of land owners and users are regulated in the Environmental Protection Law. A special form of sanction is connected with private property rights to land within the reserve. In case of violation of the protection rules, the right to use land may be suspended and private land expropriated. The state or local governments own land in LWC, while some parts are also privately owned by physical persons or legal entities. An important issue is the right for land owner and user, but also for state and local authorities responsible for carrying out conservation according to the laws and international obligations.

In accordance with the Law on Land Use & Survey (1991) and the Law on Specially Protected Nature Territories, private land owners have the right to demand compensation from the local government for financial losses resulting from the legal restrictions and obligations concerning the private land. Tax exemption is one form of compensation available. If no agreement can be reached, the owner or user may bring the matter to court. However, the legal problem is the lack of legal principles for compensation and how to consider private interests, when establishing a protected area and determining restrictions and other requirements. The state has first refusal rights to purchase private land within a protected area. On the other hand, state land within a protected area may be transferred to private ownership in connection with the land reform, but only if the person will agree to observe the rules on the protection and use of the protected area and the plan on nature protection. In other words, the land reform should not weaken existing protected areas.

(4) Institutional coordination of different sectors

Land use planning is non-sectoral. But a land use plan has to be implemented by different sectoral agencies related to agriculture, transportation, tourism, land reclamation, and the extension services, and by private organizations and individuals. There is no clear boundary between land use planning and other aspects of rural development. For example, a desirable change in land use may be the introduction of a cash crop. Successful management may require the use of fertilizer. This cannot be done unless there are local centers for fertilizer distribution, effective advice on its use, and a system of credit for its purchase. Local services will be of no use without an adequate national system of fertilizer distribution, and sufficient manufacture or allocation of foreign currency for imports. Construction of a fertilizer factory and organization of national distribution are certainly not land use planning but they may be essential for the success of planned land use.

9.2 Directions of Land Use Planning

9.2.1 Proposed Future Land Use of the Study Area

(1) Future land use map for LWC

Figure 9.2.1 presents a land use map proposed for the future land use in LWC. It is based on the present land use pattern, reflecting the above-mentioned land use strategies for LWC. The land use here has been proposed based on the analytical results of development potentials in the future, taking account of and harmonizing with proposals on land use appropriate for environmental conservation of LWC. In the course, the output of the environmental zoning has been also fed back. The depicted land use categories are classified into four areas, namely, forest land, agricultural land, urban area, and retardation basin, in addition to NPZ and AMZ.

1) NPZ and AMZ

NPZ and AMZ are absolutely identical with those of the environmental zoning. Land use for development activities is strictly prohibited in NPZ, while the present land use will be maintained in AMZ with environmental consideration. AMZ includes Lake Lubana and fishponds because they provide not only fishery resources but also valuable aquatic ecosystem to be conserved for flora and fauna as well as eco-tourism activities.

2) Forest land

It includes the existing state and private forests, and its major part covers commercial cutting forests planned by the state-shared forestry company “Latvijas Valsts Mezi”. And all the identified idle arable land is also proposed for forestry development. But wet idle land along the northwestern shore of Lake Lubana necessitates rehabilitation of the existing drainage system to a large scale even for forestry rather than agriculture. Costly drainage rehabilitation works during the period up to 2010 are not recommendable since the economic effectiveness of forestry at present is very low under LWC’s and Latvian economic situation. Ensuring timing to produce revenues enough to recover the costs

including drainage rehabilitation expenditures, forestry activities there should be commenced over a long term. Similarly, the idle state farmland located in the right bank of the Rezekne river is inundated so that the existing drainage pumping facilities must be rehabilitated to make it usable. Conversion to forests there must be considered in a long run beyond 2010, because it can be a potential site for depositing soil dredged from Lake Lubana or for establishing tourism facilities such as horse riding ground upon possible activation of eco-tourism/rural tourism in the future.

3) Agricultural land

This area mostly includes the existing agricultural land consisting of non-irrigated arable land, pastures, complex cultivation patterns, and land principally occupied by agriculture with natural vegetation. Within the area, kinds of agricultural products, cropping patterns and cultivation methods can be modified as far as neither NPZ nor AMZ are environmentally affected. A part of the farmland at Licagala is subject to the spring flood, needing expensive construction of a 6-km dike along the Aiviekste river. It is proposed that such dike construction should be considered in a long term, taking into account actual economic merits to agricultural activities as well as hydrological impacts on the whole Aiviekste river basin.

4) Retardation Basin

This area is in the biotope map categorized as inundated grassland with little possibility of any development. Instead, it has played an important role to retain excessive water flow of the rivers, especially during the flooding season. Therefore, its land use is to continue this hydrological function. In the future, development activities can be established even there, which is located outside of NPZ or AMZ. However, it is essential to replace the hydrological function lost by the development activities in other ways, in order to prevent adverse impacts toward the downstream.

(2) Change between the present land use and the proposed land use

LWC is divided into three kinds of the environmental zones, NPZ, AMZ, and DZ. The next table shows areas in km^2 by the five land use categories for the present based on at the 1998 map as well as for the proposed toward 2010 calculated from Figure 9.2.1.

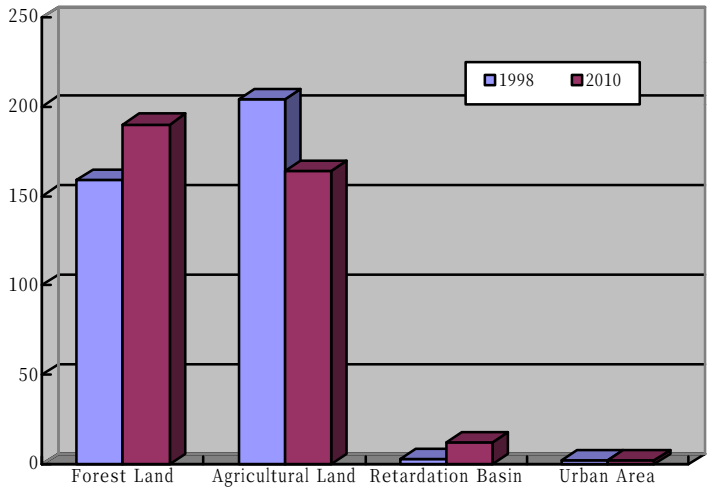
Since NPZ is strictly preserved and the present land use pattern in AMZ will not be changed in principle, there will be no land use difference between the present and the future. On the other hand, the land use pattern within DZ is proposed to change in the future. As recognized well with the graph below, a major change will be for forest land and agricultural land. The forest area in DZ will increase from 159 km^2 to 190 km^2 (20 % increase), while the agricultural area will decrease from 204 km^2 to 164 km^2 (20 % decrease). This is mainly because of conversion of idle agricultural land to forestry development area. In 2010, the land use ratio of DZ will be 52 % for forest land, 44 % for agricultural land, and the remaining 4 % for the other usage. Majority land use of agriculture in 1998 is switched with forestry in 2010.

Area Comparison of the Proposed Land Use (2010) with the Present Land Use (1998)

Land Use Legend	Year	NPZ		AMZ		DZ		Total by Land Use	
		Area (km^2)	%	Area (km^2)	%	Area (km^2)	%	Area (km^2)	%
Forest Land	1998	108	58	112	43	159	43	379	47
	2010	108	58	112	43	190	52	410	50
Agricultural Land	1998	0	0	27	10	204	55	231	28
	2010	0	0	27	10	164	44	191	24
Water Bodies	1998	1	1	93	36	0	0	94	12
	2010	1	1	93	36	0	0	94	12
Retardation Basin or Wetlands	1998	77	41	28	11	3	1	108	13
	2010	77	41	28	11	12	3	117	14
Urban Area	1998	0	0	0	0	2	1	2	0
	2010	0	0	0	0	2	1	2	0
Total by Zone		186	100	260	100	368	100	814	100

Notes: Forest Land includes broad-leaved forest, coniferous forest, mixed forest, natural grassland, transitional woodland & scrub, and sparsely vegetated area; Retardation Basin is inundated grassland, and Wetlands additionally include inland marshes and peat bogs; Water Bodies include lakes, and fish ponds; and Agricultural Land includes non-irrigated arable land, pastures, complex cultivation patterns, and land principally occupied by agriculture with natural vegetation.

Sources: Satellite "SPOT" data in 1998, and 1:50,000 Topographical Maps



Land Use within DZ in 1998 and 2010 (Unit : km^2)

9.2.2 Implication with EMP

The strategies for land use planning and the future spatial land use map proposed in the previous sections are an essential component of EMP for LWC. The strategies and future land use are based on the basic concept mentioned in the guideline on regional development as well as the present land use condition of LWC. Therefore, they are to be altered when the development guideline is revised in the future.

(1) Democratic coordination of different landowners

Land in LWC is owned by different stakeholders such as private persons, private enterprises, the state and local municipalities. The ratio of private land is increasing also in the study area according to the national privatization policies. Especially, a major part of agricultural area is owned by individuals. It is a sensitive matter for private owners to alter

the present land use pattern, since it directly affects their living conditions. In particular, due agreement and compensation should be required where private land is planned to be converted to the strict nature 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 democratically by providing local people with opportunities to participate in planning the concrete land use for LWC under the EMP framework.

(2) Maintenance of the existing land use pattern

The already established land use situation should not be changed as much as possible, also ignoring 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. It means that that spatial extension of conservation area except for the proposed strict nature protection area is not favorable from the land use's standpoint. Maintenance of the present land use pattern implies that a large part of LWC continues to be utilized for agriculture, forestry and fishery in the future. Instead of expansion of the land for such primary industries, production should be improved by intensively inputting production resources, although application of land use technologies friendly to environment is recommended as a land use direction. EMP is to take these into account in environmental zoning.

(3) Flexible and multiple usage of the development land

In the spatial land use map in Figure 9.2.1, both the agricultural and forest lands are proposed. In these lands, idle arable land is recommended to be flexibly converted between cultivated land and forest depending on economic profitability of both industries. The agricultural and forest lands will 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. Water level management plan under EMP should propose water level criteria to harmonize these two purposes.

9.2.3 Recommendations

(1) Detailed assessment on land capabilities of LWC

Land capabilities are described by the land qualities needed for sustained production. The next table lists typical land qualities. For LWC, the choice of land characteristics is limited to those for which information is already available or can be gathered quickly. More detailed assessment on land capabilities thus necessitates data collection about critical land qualities through further researches.

Land Qualities for Agriculture

Land Qualities	Land characteristics that may be used to measure the quality
(a) Sufficiency of energy	Sunshine hours in growing season, temperature regime
(b) Sufficiency of water	Evaporative demand set against rainfall, soil water storage and rooting conditions
(c) Conditions for ripening	Period of successive dry days with specified sunshine and temperature
(d) Climatic hazards	Frequency of damaging frost, hail or winds during growing period
(e) Sufficiency of oxygen in the root zone	Soil drainage class, depth to water table
(f) Sufficiency of nutrients	Soil nutrient levels, pH, organic matter content
(g) Erosion hazard	Rainfall and wind erosivity, set against soil cover, slope angle and length, and soil permeability; calculated soil loss in tonnes/ha/year; or loss of nutrients in kg/ha/year
(h) Toxicity	Soluble Al, Fe; pH

Source : Guidelines for Land Use Planning, FAO, 1989

(2) Establishment of an independent land use planning unit

An independent land use planning unit is recommended to be established for LWC. This will need a range of expertise, access to sufficient authority and the ability to make quick decisions. If it is yet another sectoral body, it will merely compete with other agencies and will not be in a strong position either to influence their programs or to implement plans of its own. The most effective situation for the land use planning unit is as a direct support to the executive. At the highest level, land use planning might be dealt with by a small committee of permanent members drawn from the local municipalities and agencies concerned with LWC. The land use committee should make recommendations on priorities, the creation and allocation of resources, and the establishment, approval and coordination of land development programs. Alternatively, these functions could be added to the Environmental Management Center and its Implementation Committee.

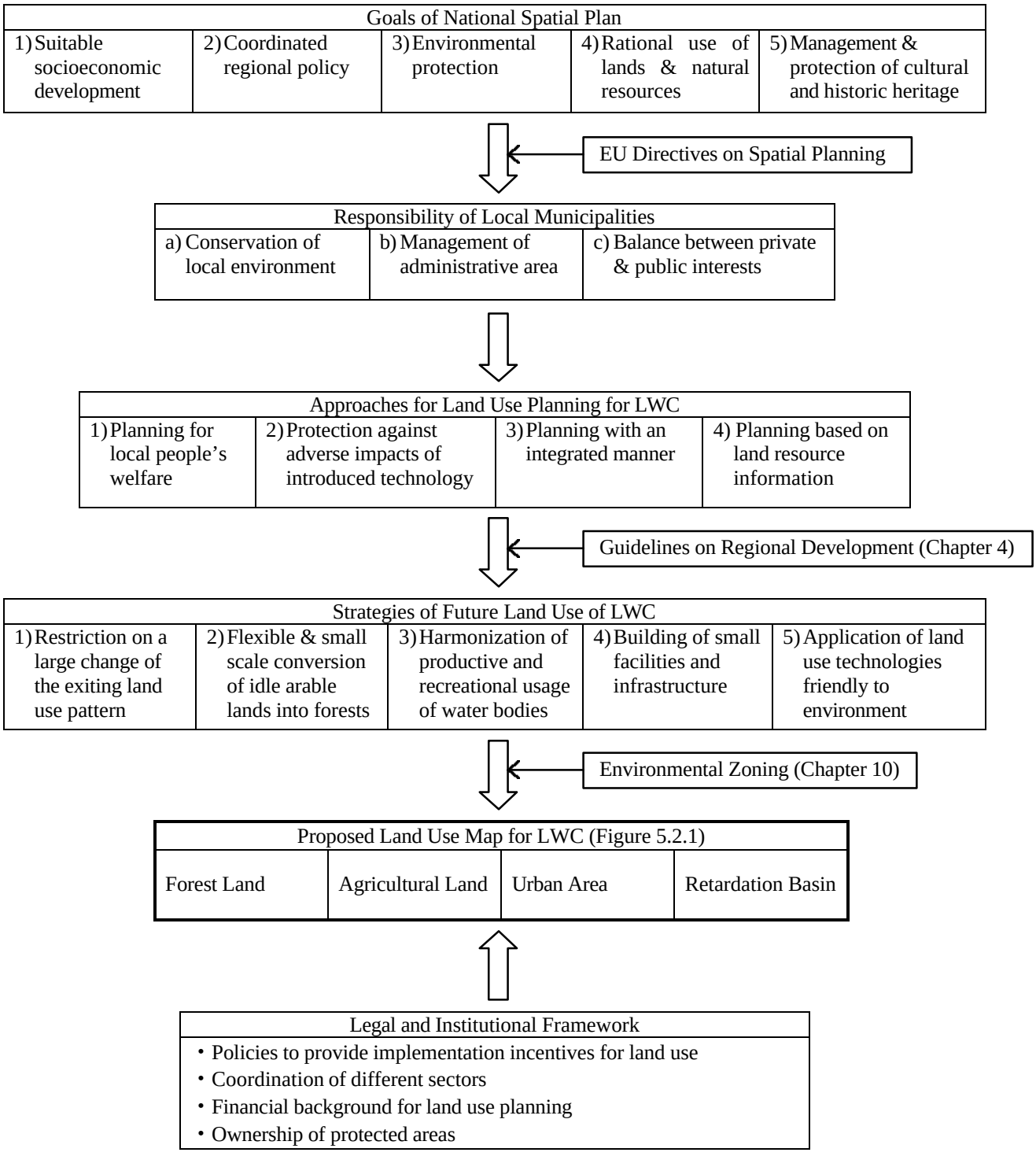


Figure 9.1.1 Schematic Chart of Land Use Frame for LWC

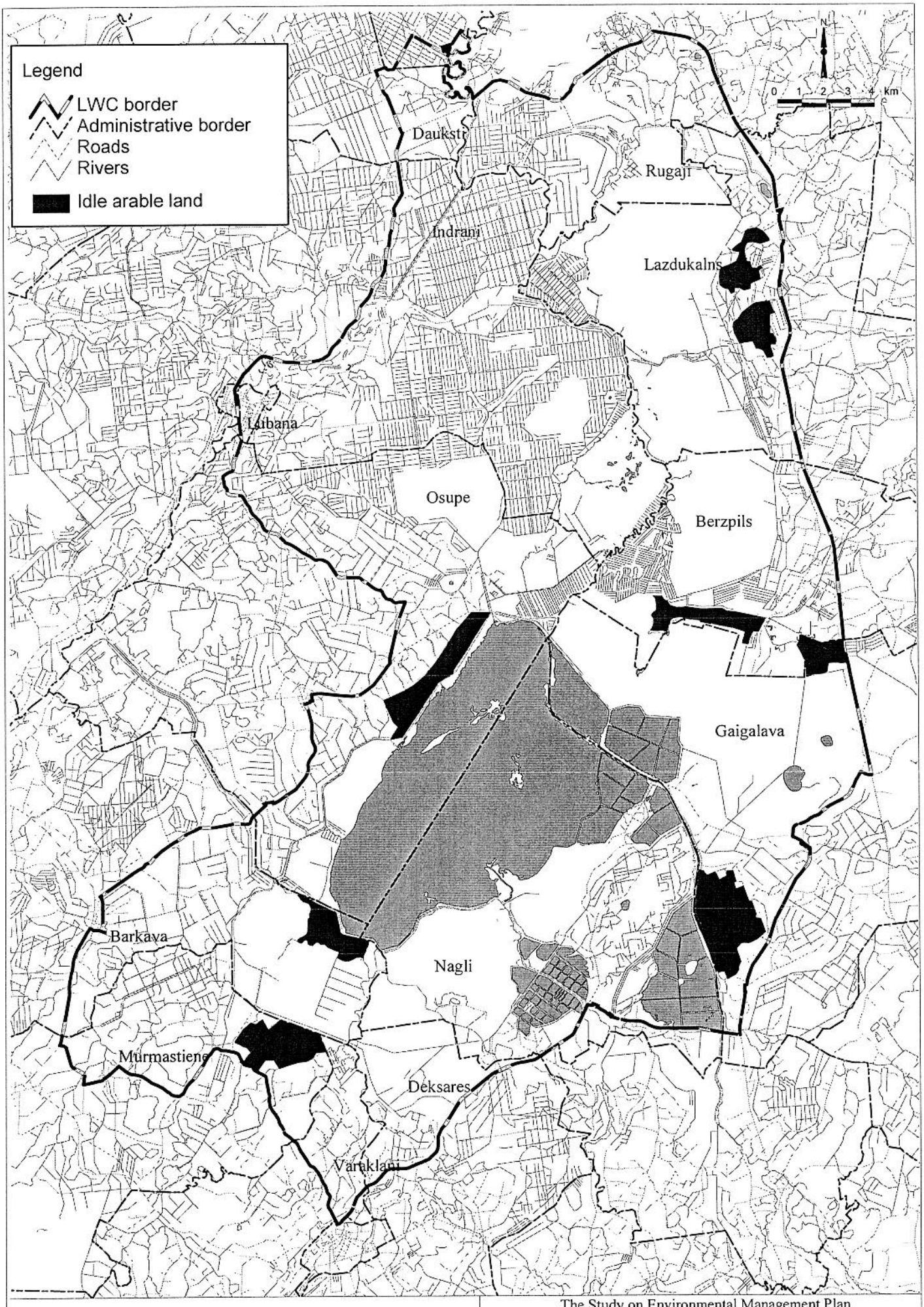


Figure 9.1.2 Idle Arable Land

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

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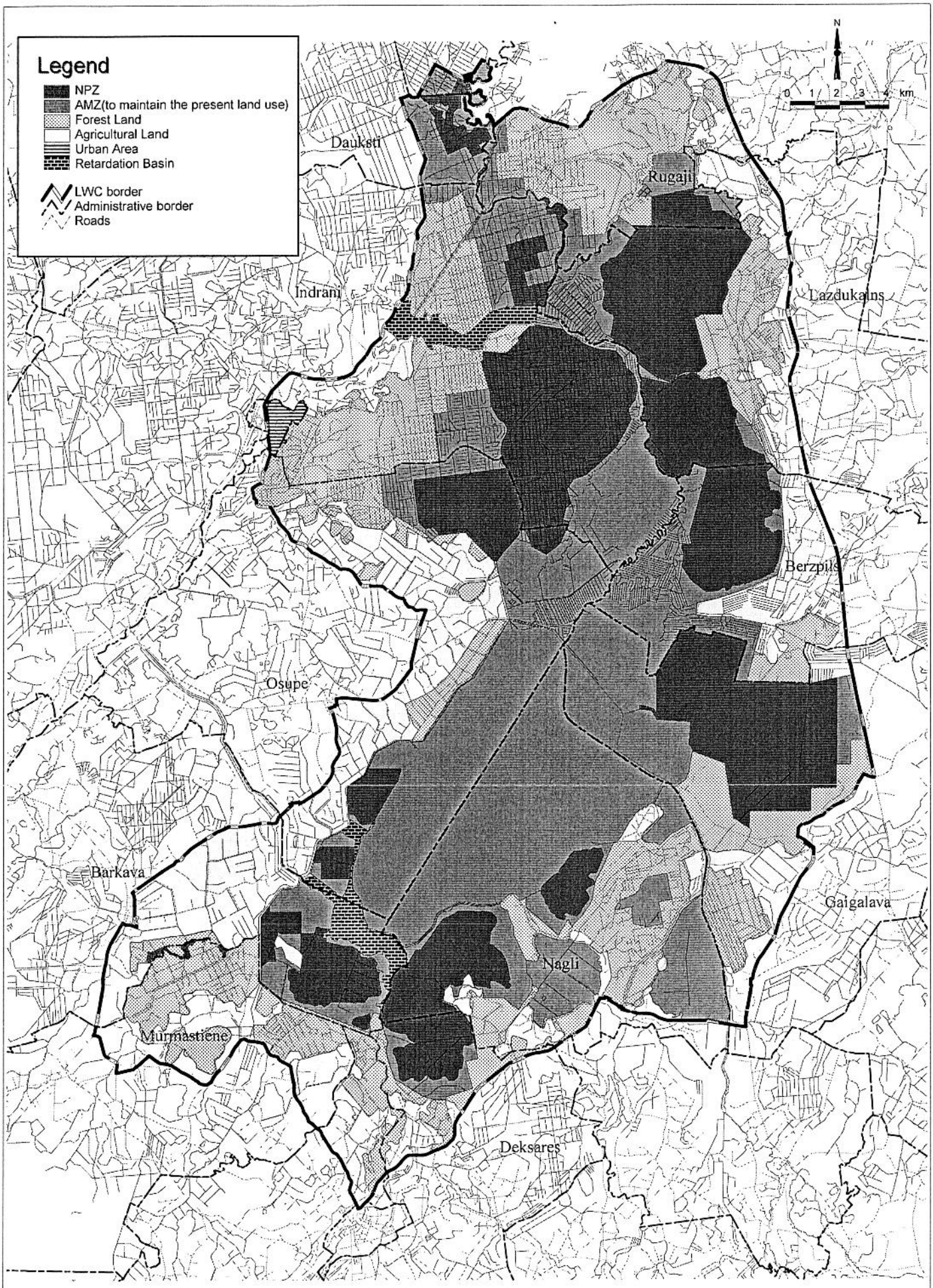

Figure 9.2.1 Proposed Land Use Map

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

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CHAPTER 10

PART III ENVIRONMENTAL MANAGEMENT PLAN

CHAPTER 10 FRAMEWORK OF THE ENVIRONMENTAL MANAGEMENT PLAN

10.1 Rationale

10.1.1 Background of the Study Area

One of the substantial issues in the study area is a rehabilitation of the economic situation. Major local industries such as agriculture and fishery have been suffering from the sluggish economy due to the loss of main markets, and both local income level and employment rate are much lower than the national average. The economic revitalization is indispensable not only for the improvement of local people's living standard, but also for financial build-up to promote wetland conservation.

In the past 60 years, inundation has been controlled by embankments surrounding Lake Lubana and construction of drainage canals mainly to protect the local agricultural activities. The water level of the lake and fishponds has been raised to keep preferable conditions for aquaculture. However, it has been reported that the number of birds flying to the area has been decreasing drastically and drying of the peat has impacted vegetation, biotope, and wildlife because of such artificial controls of natural water level. Thus, it is crucial to establish a well-balanced water level management that coordinates interests from both environmental and development points of view in a harmonized manner.

The Lubana Wetland Complex (LWC) is one of the largest wetlands in Latvia which consists of a wide range of water bodies, forests, grasslands, fishponds, and mires. It is endowed with rich and unique biotopes and natural resources providing preferable habitats for fauna and flora. A growing tendency toward conservation of LWC has increased recently among the local people seeking a way for active and sustainable use of its abundant natural resources.

(1) National Policy on Environmental Management

In Latvia, the Law on Environmental Protection of 1991 (LEP) amended 1997 is to provide the basic rules and principles on environmental protection and management of natural resources. Based on LEP, the National Environmental Policy Plan (NEPP, 1995) shows goals as sustainable use of natural resources and landscape protection in 1995 and the National Environmental Action Plan (NEAP, 1997) lists actions intended to implement the measures and goals set in NEPP.

a) Achieving sustainable use of natural resources,

b) Integrating environmental considerations into key socioeconomic decisions,

c) Maintaining current level of biodiversity and landscape characteristics, and

d) Improving environmental quality and ecosystem stability.

The Latvian's overall targets on nature conservation is to prevent a further deterioration of natural environment and to maintain the current level of biodiversity and landscape characteristics in line with the European Union (EU) approximation under the turmoil by economic transition and privatization after independence. Thus, the improvement of environmental quality and ecosystem stability and the prevention of environmental pressure caused by use of natural resources are put high priority in areas where human activities have been concentrated. In order to achieve this target, the Government of Latvia (GOL) advocates the rational use of the limited regular budget, better consultations with local communities and landowners, and institutions managing biological resources.

(2) Categorization of the Nature Protection Area in Latvia

According to the regulations under the Law on Environmental Protection (LEP) amended in 1997, a nature protection area is classified into the following seven categories putting an order of strictness for protection. The Nature Reserves (category I) are the most important natural areas with the strictest regulations, which are only five areas in Latvia including the Teici nature reserve. The National Parks (category II) are the secondly important nature protection areas, and two areas, namely the Gaujas national park and the Keneru national park have been designated. Recently, new designation of nature protection areas seems to be controlled by the Government of Latvia (GOL) applying stricter criteria in accordance with the European Union (EU) directives which require more sufficient environmental information.

Category of Nature Protection Area in Latvia

No.	Category	Definition
I	Nature reserves	The most important natural areas that have not changed and disturbed by the people.
II	National parks	The wide areas that have nationally important nature, biotopes, landscapes, cultures, and historical monuments.
III	Biosphere reserves	The wide areas that have important nature, biotopes, and landscapes.
IV	Restricted areas	The representative areas of unchanged and vulnerable nature, endangered wild species, and unique and beautiful landscapes.
V	Nature parks	The areas that have natural and cultural values suitable for recreation and education.
VI	Landscape protection areas	The areas that have unique and nice natural landscapes suitable for recreation and tourism.
VII	Nature monuments	The areas including distinguished natural objects, such as trees, caves, water sources, water falls, and rocks that have scientific, historical, cultural, aesthetic, and ecological values.

Source: General regulations on protection and use of special protected nature areas, LEP, 1997

10.1.2 Justification of Environmental Management Plan (EMP)

(1) Prospected Issues on Environmental Management in the Study Area

Considering the current situation of LWC, the following seven issues could be prospected from a view point of environmental management of the study area. They express that there

exist institutional, administrative and financial problems to be solved toward the proposed EMP's implementation.

1) Insufficient initiative on regional spatial development planning from central to local government

A well developed spatial plan based on the national socioeconomic development frame should be a base of concrete physical planning for regional development and environmental management. Although a clear demarcation of roles and responsibilities on spatial planning between central and regional governments, it seems not to work out well in actual practices especially at the regional level. Possible reasons are lack of strong initiatives of the central agencies and shortage of practical experiences of the local agencies. This is typical in LWC because of the fact that the current protection movement has been initiated by the conservation concerned people and LWC has less incentives to prepare a specific spatial plan for the officers concerning the regional development.

2) Weak coordination between environmental protection sector and other development sector

The current sluggish economy damages the regional development and income level of the local people on one hand, but it has given advantages on the natural environment of LWC on the other hand. In other words, LWC could have been fully used for economic activities and very few natural environment would have remained, if Latvia did not experience entire loss of market and transitional economy. This means that the Environmental Management Plan (EMP) of LWC should be established based on the agreement with relevant development sectors. Otherwise, the precious natural environment of LWC will be easily lost as the regional economy improves.

3) Unclear coordination system to cope with conflicts between environmental protection and interests of the local people

At present, returning lands to the previous owners is the Latvian national policy. Thus, a progress of land privatization could be critical threats on the conservation of natural environment in LWC. Any restrictions on land use and economic activities for nature protection require an agreement of landholders giving some incentives to them. The EMP take this issue into account on environmental zoning and categorization.

4) Poor capability on regional development and management planning

The Rezekne District Development Strategy prepared by the Rezekne District Council (RDC) shows current difficult situations and future strategies on socio-economy, but it little gives a clear linkage among goals, strategies, and projects. Moreover, it did not clarify an action program and a way how to implement. It is apparent that the regional development and management plan without enough implementation and enforcement capabilities would bring about more indifference and distrust to the plan among the stakeholders. The EMP of LWC needs rigorous and stable provisions in its implementation.

5) Not sufficient environmental monitoring system and performance, especially on biodiversity, landscapes, and game refuge

Scientific and technical information is required for effective implementation of the environmental management. However, no periodic monitoring station and systematic monitoring program exist mainly due to budget constraint of the province. The current constraints include shortage of technology, equipment and skilled personnel. For example, quality assurance and control procedures are often inappropriately applied in the steps of the monitoring program, and experience in designing of monitoring programs is limited. It is necessary to prepare an appropriate environmental monitoring program in LWC in accordance with the national and international level.

6) Lack of dissemination activities of environmental information, environmental education

The general level of environmental awareness of the local people is relatively low in and around LWC. Pressures on the natural environment by economic activities of the people lacking in environmental awareness decline environmental quality of LWC. More efforts are required for dissemination of environmental information and environmental education.

7) Limited financial resources and budget shortage of the regional agency responsible for environmental management

Most regional agencies concerned with environmental management of LWC do not have sufficient financial resources to fulfill their environmental responsibilities, to train staff, to monitor environmental conditions, and to conduct necessary research and development. Considerable efforts for funding are required to increase the financial capacity of the agencies concerned.

(2) Justification of EMP

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 Preservation (one of international NGOs in Europe) identified LWC as an important bird area in Europe and recommended its conservation in the early 1990s. It is natural then that a movement to apply LWC for a registration of Ramsar site arose among the concerned people.

Based on the great concerns on conservation of LWC and legal initiatives of LEP, several broad discussion meetings led by the Rezekne and Madona Regional Environmental Board (REBs) were held in 1996 with participation of regional officers of forestry and fishery, academic groups, and local residents. It resulted in the approval of the Cabinet Ministers for 11 nature protection areas of about 360 km^2 in LWC in 1999. The participants also recognized that there were a lot of issues to be solved and clarified related to organization, hydrology, agriculture, fishery, nature conservation, and research works, and

unanimously agreed to continue further efforts for conservation of LWC and formulation of EMP through a series of discussions.

10.2 Overall Concept

EMP for LWC should envisage a direction of regional development and land use because the current economic depression in the region would affect effectiveness and efficiency of actual implementation of EMP. It means that a concept of "Wise Use" must be substantial for EMP of LWC as shown below. Therefore, a comprehensive EMP consisting the following six elements is prepared for LWC.

a) Wetland Conservation Plan,

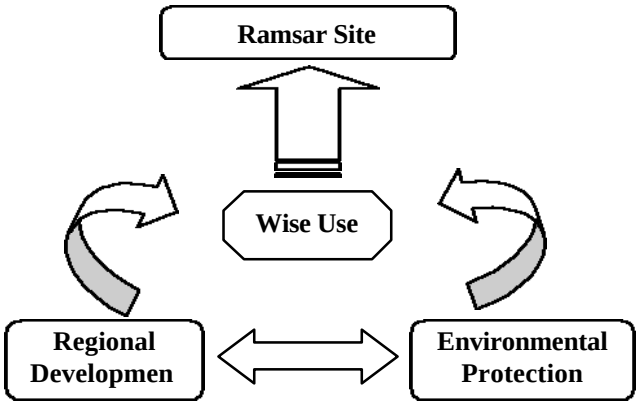
b) Eco-tourism Development Plan,

c) Guideline for Environmental Information Management System,

d) Water Level Management Plan,

e) Guideline for Regional Development, and

f) Directions for Land Use Planning



The EMP indicates the implementation program, the relation with the local development plans, and the environmental benefit of the local society as much as possible. Thus, the EMP should lead the people concerned to contribute and participate in wise use of natural resources, and should guide the direction of environmental conservation in regional development plans by giving common environmental goals and targets of LWC.

10.2.1 Vision and Goals of EMP

The fundamental vision of the EMP for LWC is set as:

"Wise Use of the Lubana Wetland Complex".

The goals to attain this vision are set to be (1) Conservation of Natural Environment and (2) Sustainable Use of Natural Resources. The general concept of vision, goals, and major strategies is shown in Figure 10.2.1.

(1) Conservation of Natural Environment

LWC is one the most important wetlands for habitat of fauna both in Latvia and in Europe, and has been nominated for a Ramsar wetland. Its fairly good natural environment have been kept just thanking for the current economic depression. However, it does not have enough social and legal frame for protection in the future. Therefore, conservation of natural environment in LWC needs top priority. This goal must give a way for designation to the Ramsar site in the future.

(2) Sustainable Use of Natural Resources

The land of LWC is rich in natural resources such as trees, fish, and peat, and has high development potentials using its valuable natural environment and landscape especially for fishery, forestry, and eco-tourism. These natural resources are ecologically vulnerable, and can be lost forever by careless use, exploitation, and consumption. Moreover, the condition of land tenure is complicated in LWC. There are a lot of private land holders and their numbers will be increased in progress of the national land returning policy. Thus, it is required to seek a way for sustainable use of natural resources for nature conservation and regional development.

10.2.2 Target Area and Year of EMP

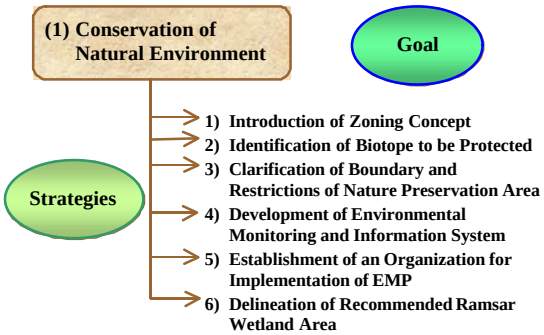
Although the proposed EMP will be comprehensive consisting of six basic components which have different planning scales and dimensions, the vision of EMP is focalized to the Wise Use of LWC. Therefore, the target area of EMP should be the whole LWC (about 810 km^2) including Lake Lubana, which is the same as the study area. The target year of the EMP is set at 2010 in accordance with the agreed Scope of Work (S/W) of the current JICA Study.

10.2.3 Strategies of EMP

In order to attain the vision and goals of EMP for LWC, it is necessary to set strategies which will guide actual components and projects in EMP. Since the goals of EMP are set as (1) Conservation of Natural Environment and (2) Sustainable Use of Natural Resources, the 6 strategies for the respective goal should be taken for EMP.

(1) Conservation of Natural Environment

For this goal, the following six strategies should be taken for EMP. Details of each strategy are described as right.



a) Introduction of Zoning Concept

The land use pattern in LWC is not so simple in type and location because it has been primarily used for production of agriculture, fishery, and forestry sector. Although a lot of areas having precious natural environment can be found there at present, these are located sporadically in and around agricultural and forest areas. In other words, LWC is a complex mingling of various land use and areas to be protected from development. Accordingly, it is not suitable to set a uniform protection frame in LWC as a whole. A functional zoning method is common in Latvia, but its application is limited only in the nature protection areas authorized by the government. Although some area of about 360 km2 in LWC was designated as a nature protection area, it covers about one third of the total area of LWC. Therefore, a broadly categorized zoning concept envisaging regional development should be introduced for formulation of EMP in LWC.

b) Identification of Biotope to be Protected

Nobody can deny LWC's richness of biotopes of natural environment. However, the biotopes in LWC itself vary from the most precious to common one. At present, there are insufficient data and information related to concrete components of rich biotopes. No specific criteria exist for what to be protected or not in LWC. This must be the first step for planning nature conservation. Otherwise the proposed EMP could be only a paper work. Thus, the identification of the biotopes to be protected through the Study should be acute and essential for formulation of a workable EMP in LWC.

c) Clarification of Boundary and Restrictions of Nature Preservation Area

LWC is a huge area which provides important habitats for fauna and flora, and formulates a valuable ecosystem. The location and range of each ecosystem is normally fluctuated by physical and chemical change of surrounding area. The identified areas of precious natural environment should be protected from impacts caused by economic activities and other land use pressure. It may require to control privatization of land or to set some restrictions of landholders. So, it is crucial for nature protection to delineate nature preservation areas as accurate as possible by introducing an environmental zoning method. This is not so easy task, so a periodical environmental monitoring should be continued to take proper and quick countermeasures for conservation.

d) Development of Environmental Monitoring and Information System

Understanding of the regional ecosystem is essential for nature conservation, but it requires a lot of site specific ecological data and a long term examination related to a succession of natural ecosystem. Otherwise effective and efficient conservation directions and measures can not be found. LWC is not an exemption. Therefore, a systematic environmental monitoring should be established, and these scientific data of ecology including its seasonal and long term change must be reflected in actual implementation of EMP. It could be an effective way to incorporate LWC's environmental monitoring

system into that of the Teici nature reserve as much as possible considering limited sophisticated staff and equipment.

If LWC has been well developed area and it would not be appropriate to give strict restrictions of socioeconomic activities in the whole LWC area. This means that the precious and valuable natural environment must be protected and maintained in actual regional situation. The nature conservation would be confronted with serious condition unless the local people and other stakeholders recognize its importance for themselves and cooperate on its implementation. To provide the accurate and timely information of natural environment enable to lead discussion with the local people to a right orbit, and the environmental education also enable to the future generation.

e) Establishment of an Organization for Implementation of EMP

The EMP includes broad management components which will require high capabilities of coordination and actual management practice. The current official agencies concerned to EMP of LWC extend widely, such as the Rezekne and Madona REBs under MEPRD responsible for natural environmental, the Department of Planning, Department of Agriculture, Department Fishery, and Department of Forestry under the District Council of 4 districts, and the Aiviekste Land Reclamation System Administration (ALRSA) under MOA responsible for operation and maintenance of water level control facilities. However, the current management system is lacking a core organization having the initiative, and this has caused difficulties for decision making and for taking aggressive actions. Therefore, to establish one independent responsible organization with clear right and power is considered to be suitable for actual implementation of EMP of LWC.

Since a drastic institutional and organizational change might bring about some confusion in the current administrative system, the creation of an ad hoc “Implementation Committee” consisting of the agencies concerned could be practical for the time being. It should be noted that the establishment of new management authority including representatives of the local people is recommendable for actual implementation of EMP in future.

f) Delineation of Recommended Ramsar Site

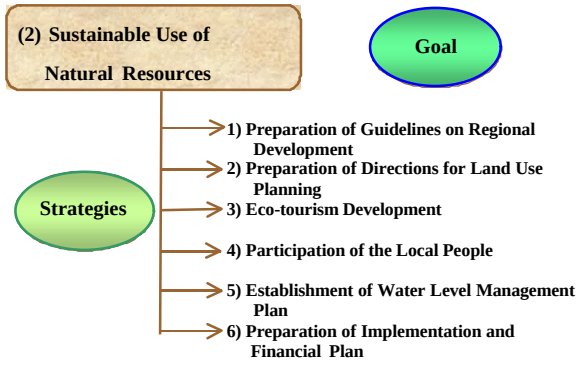
The Teici nature reserve is a precedent Ramsar site in Latvia especially focusing on conservation of natural environment. The long term vision of the Ramsar Convention is the wise use of wetland. This vision does not mean a conservation oriented approach and it is rather suitable for a wetland like LWC. The vision set for EMP is the “Wise Use of Lubana Wetland Complex”. Thus, the ultimate figure of LWC could be a Ramsar site.

The name of Ramsar is now a superior world brand. Designation of LWC to a Ramsar site expresses strong commitment of the people concerned to take care of LWC as an indispensable resource. This also appeals the existence of LWC to the world and contributes to promote activation of regional economy such as eco-tourism. The EMP

should propose the appropriate area for a Ramsar site considering actual situation of wetland in LWC.

(2) Sustainable Use of Natural Resources

For this goal, the following six strategies should be taken for EMP. Details of each strategy are described below.



a) Preparation of Guidelines on Regional Development

Economic stability and financial back up is essential to implement EMP, so it is important to activate the sluggish local economy by rehabilitating the existing industries, by using rich natural resources, and by introducing a new development sector including eco-tourism and agro-tourism. In Latvia, each district has responsibility for formulation of a regional development plan, and the four districts which partly include the LWC area have already prepared the district development plans. Considering the vision and goals set for EMP, its development approach must be a wise use of natural resources and environmentally friendly. However, these did not always properly focus on the development of LWC, because LWC is inter district lands which embrace quite unique wetland natural resources. Therefore, it is necessary to establish specific guidelines on regional development suitable for LWC. The guidelines should lead a concrete and detailed development plan of LWC in accordance with the current district development plan.

b) Preparation of Directions for Land Use Planning

At present, LWC does not have enough social and legal frame both for regional development and for nature conservation. Therefore, a land use plan could be one of substantial tools for actual implementation of EMP. The directions for future land use planning should be prepared carefully taking account of the guidelines on regional development and the result of environmental zoning in LWC. The proposed directions for land use will serve as the base for further development of EMP.

c) Eco-tourism Development

For sustainable conservation of the wetlands and regional development, it is important to seek potential ways which will make wise use of natural environmental resources, especially wetland ecosystems and landscapes. One of the potential development ways is eco-tourism as its major sources are natural environment in LWC. The eco-tourism is considered to be a compatible strategy for nature conservation and economic development. Moreover, it is a useful tool to disseminate environmental awareness to the local people through participation because they could recognize that to conserve natural environment is to sustain their lives too.

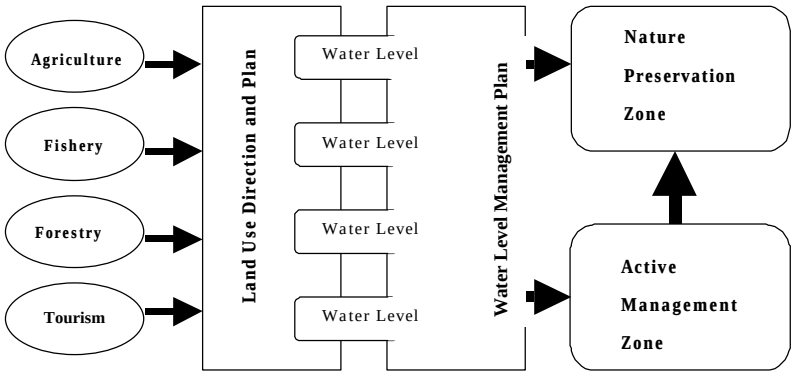
The guidelines on regional development should justify the eco-tourism in LWC in its development approach. The possibility and realistic directions of eco-tourism are to be clarified in EMP based on economic contribution on the local societies, synergy effects on other tourism sites such as the Teici nature reserve and Lake Razna, and negative impacts on the wetlands considering experiences of the neighboring countries.

d) Participation of the Local People

A future figure of LWC fully depends on the will of the local people. It should create incentives for the local people to follow the plan's directions and to be actively involved in its implementation in order to effectively implement EMP. Thus, EMP should incorporate opinions of the local people and the interest groups concerned to formulate the plan and to reflect their intentions on environmental conservation and future development in a harmonious manner.

e) Establishment of Water Level Management Plan

Considering actual conflict of interests concerned with water level management between water use and wetland conservation, it is essential to develop an integrated water level simulation model and to design the Water Level Management Plan in EMP as shown below. This quantitative analysis tool surely provides basic information for establishment of a well-balanced water level management that coordinates interests from both environmental and development points of view in a harmonized manner.



Concept of Water Level Management Plan

f) Preparation of Implementation and Financial Plan

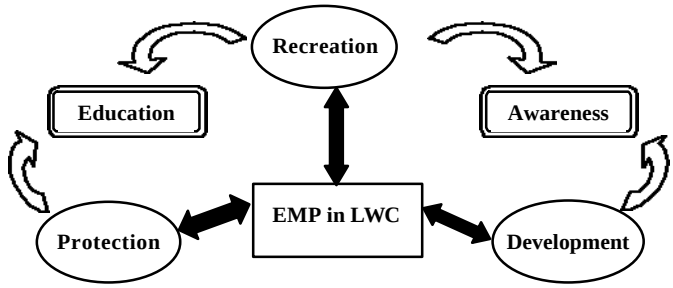
Local features of environmental functions, natural resources, financial and institutional capacities, local expertise and available infrastructure should be considered to formulate a feasible EMP which is able to be fully carried out on a regional basis. Therefore, EMP should depict its concrete implementation plan and financial plan by assessing local features and necessary resources to attain locally feasible and sustainable plan.

10.3 Environmental Zoning

10.3.1 Zoning Category

(1) Roles of EMP in LWC

Considering the vision of EMP for LWC, the EMP area should envisage the wise use of LWC by harmonizing nature conservation and regional development. This means that EMP in LWC should have substantial roles of 1) Protection of natural environment, 2) Recreational use of natural resources, and 3) Development of regional socio-economy. These roles are ultimately connected to "the Environmental Education" and "the Public Awareness" as shown below and Figure 10.3.1. Therefore, the environmental zoning of LWC should be strategically designed for fulfillment of these roles.



Roles of EMP

(2) Zoning Concept

The EMP area was once fully developed especially for agricultural production. Only the current sluggish economy allows LWC to keep rich and valuable natural environment. This compound circumstance characterizes LWC because unregulated development could surely exhaust natural resources and the vulnerable nature would be lost forever. Thus, the EMP area should be divided into three zones, namely Nature Preservation Zone (NPZ), Active Management Zone (AMZ), and Development Zone (DZ).

1) Nature Preservation Zone (NPZ)

NPZ is defined as a nature preservation oriented area in LWC. This zone should be delineated by priority evaluation of biotopes for preservation of wetland vegetation and important habitats of fauna. NPZ includes the most important natural environment from various viewpoints, so it corresponds to strict protection quarters which are representative for unchanged and vulnerable nature, endangered wild species, and unique and beautiful

landscapes, stipulated in the Latvian regulations under LEP. NPZ should ensure the protection of the invaluable natural environment even after retrieving a vital situation of the regional economy as it was.

2) Active Management Zone (AMZ)

The creation of AMZ is indispensable to attain the vision of EMP for sustainable use of natural resources of LWC. It is impossible to achieve sustainable protection of natural environment without any understanding and cooperation of the local people. Thus, the rich natural resources should be materialized for economic and educational activities with the wise use manner as the Ramsar Convention explicitly stated. AMZ is not so strictly restricted as NPZ, but any socioeconomic activities must be developed without affecting natural environment in NPZ. In other words, AMZ should be a buffer area of NPZ. So, this zone could be a potential eco-tourism development area with wise use of natural resources in LWC. The eco-tourism in LWC itself has its own affording capacities related to number and type of tourists and facilities based on the magnitude of negative impacts to the natural environment.

3) Development Zone (DZ)

DZ is a development oriented area for industries such as agriculture, forestry, fishery, and tourism in LWC. This zone is rather free of development and land use unless affecting NPZ and AMZ, and violating national and regional regulations. It means that the ecologically friendly regional development and socioeconomic activities are recommended in this zone.

(3) Implication of Environmental Zones with EMP

The EMP consists of six plans and guidelines, and these components require different functions to the environmental zones as shown in Figure 10.3.2.

The environmental zone will show 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. The eco-tourism should be developed in AMZ, and its development plan should envisage an environmental education and recreational use of natural resources to contribute public awareness and regional economy.

The water level management plan will propose effective and efficient operational rules of water level control facilities based on the requirement of the wetland conservation plan. In NPZ, a modification should be applied because of its preservation approach. In AMZ and DZ, however, a rehabilitation and reconstruction should be applied for protection, conservation, and restoration of natural environment.

The guideline for EIMS will use NPZ and AMZ for scientific research and environmental monitoring to evaluate effectiveness of conservation measures and to decide additional measures. It will also use AMZ and DZ mainly for environmental education and public

awareness. While, the guideline for regional development and the directions for land use plan gives a way of regulatory approach both in restriction and activation of human activities.

10.3.2 Environmental Zoning in LWC

(1) Delineation of Environmental Zones

The zoning delineation is carried out in accordance with the consideration of nature protection, eco-tourism, and land use for development.

All the biotopes identified as the strict nature protection area are zoned as NPZ. AMZ is demarcated by selecting the regular and seasonal protection quarters which are the biotopes mostly for eco-tourism. All the fishery area proposed in the spatial land use map are included into AMZ. Rural tourism, agriculture, forestry and fishery are also allowed AMZ as far as these development activities hardly affect the existing natural environment which is essential to eco-tourism development.

The rest of LWC is naturally selected as DZ, where restriction on development is weak. But development activities and land use should be harmonious with and friendly to environment so that DZ can have a buffering function for NPZ and AMZ. Rural tourism, agriculture and forestry are to be implemented in DZ. Any inundated lands exclusively for agriculture and also for rural tourism in DZ should be protected with water control measures for stable agricultural products.

Besides, 11 nature protection territories in LWC have been approved by the Cabinet Ministers in 1999. Detailed regulations are planned to be set by the Government in each protection territory. At present, the detailed regulations have been prepared only for 3 territories, namely the Lubana depressions (No.6), Parabaine (No.8), and Pededze river lower stretch (No.9). By adopting a functional zoning approach, these regulations clarify allowed and/or prohibited human activities. A strict protection quarter defined in these regulations is considered to correspond to NPZ, and regular and seasonal protection quarters are to AMZ compared with the concept and definition of zoning categories of EMP. The environmental zoning procedure of LWC is summarized as Figure 10.3.3.

(2) Zoning Map

Figure 10.3.4 depicts the conclusion of environmental zones in LWC in accordance with the delineation approach mentioned above, and the table below shows zoning areas by biotope classification. NPZ is mostly surrounded by AMZ and mainly located in the central part of LWC. DZ is scattered close to the study area's boundary and is surrounding AMZ.

The areas of each zone are 186 km^2 (23% of the total LWC area) for NPZ, 261 km^2 (32%) for AMZ, and 367 km^2 (45%) for DZ, respectively. About 50% of the total NPZ is covered by the raised and transitional bogs which have high ecological values in wetland, and

followed by the coniferous forests (34%). As for AMZ, it is occupied by the wide areas of the water bodies (80 km^2) and the deciduous forests (65 km^2). It should be noted that most part of the fen and inundated grassland is concentrated in this zone. In DZ, the dry grassland and agricultural land occupies large area (193 km^2), and followed by the deciduous forest (100 km^2), and the coniferous forest (56 km^2) mainly due to activities of forestry.

Zoning Area by Biotope

(Unit: km^2)

Biotope Classification	NPZ (%)		AMZ (%)		DZ (%)		Total (%)	
1) Raised and Transitional Bog	93.2	(50)	3.5	(1)	3.3	(1)	100.0	(12)
2) Fen	2.6	(1)	12.0	(5)	0.7	(~0)	15.2	(2)
3) Inundated Grassland	5.4	(3)	35.6	(14)	11.5	(3)	52.5	(7)
4) Coniferous Forest	63.1	(34)	31.1	(12)	55.7	(15)	150.0	(19)
5) Deciduous Forest	19.5	(10)	64.6	(25)	99.5	(27)	183.7	(23)
6) Broad-leaved Forest	1.1	(1)	1.1	(~0)	~0.0	(~0)	2.2	(~0)
7) Dry Grassland and Agricultural Land	0.5	(~0)	5.3	(2)	192.7	(53)	198.5	(24)
8) Fish Pond	0.0	(0)	26.9	(10)	0.4	(~0)	26.9	(3)
9) Lake, River and Canal	0.9	(1)	80.4	(31)	1.1	(~0)	82.6	(10)
10) Urban Area	0.0	(0)	0.0	(0)	2.4	(1)	2.4	(~0)
Total	186.3	(100)	260.5	(100)	367.3	(100)	814.0	(100)

10.3.3 Conservation Criteria by Environmental Zone

The next table summarizes definition, present features, conservation criteria, allowable development and inundation control for each environmental zone. Considering the EMP's direction, vision and goals emphasizing wise and sustainable use of LWC, the following criteria for each zone's conservation are qualitatively proposed:

a) In NPZ, environmental quality levels at present should be maintained or improved by preserving biodiversity, ecosystem functions and landscapes;

b) In AMZ, there should be no occurrence of negative impacts due to human activities which damage natural environment of NPZ and potential eco-tourism resources in AMZ itself; and

c) In DZ, environmental buffering functions should be established and maintained to prevent negative impacts of LWC's surroundings on ecological values in NPZ and AMZ, by means of development approaches harmonious with and friendly to LWC's ecosystem.

The conservation criteria set below should be achieved by the well combination of a facility plan and a regulatory plan, described in the next section.

Conservation Criteria and Other Characteristics for Environmental Zone

Environmental Zone Type	Nature Preservation Zone (NPZ)	Active Management Zone (AMZ)	Development Zone (DZ)
Definition	Area for strict nature preservation	Area for restricted human activities	Area for further development
Present Features	- Unchanged and vulnerable nature - Endangered or important flora and fauna - Unique and beautiful landscapes	- Developed area for agriculture, forestry and fishery - Potential natural resources for eco-tourism - Less naturalness than NPZ	- Developed area for agriculture and forestry - Less biodiversity and ecological value than AMZ
Conservation Criteria	Preservation of the present levels of biodiversity, ecosystem functions and landscapes	No occurrence of negative impacts to natural environment in NPZ and to eco-tourism objects in AMZ	Maintenance of buffering function for NPZ and AMZ to prevent adverse impacts on wetland ecosystem from the outside
Allowable Development and Inundation Control	No development and no artificial inundation control	- Eco-tourism - Commercial fishery harmonized with eco-tourism - Restricted agriculture, rural tourism and forestry with environmental protection measures - No additional inundation control - Water level control of the lake and ponds	- Agriculture and rural tourism with inundation control - Forestry development and land use harmonious with and friendly to environment

10.3.4 Regulatory Plan

(1) Current Regulations for Nature Protection Territory

At present, the detailed regulations for three nature protection territories in LWC approved by the Cabinet Ministers are available as shown in Table 10.3.1. These territories are divided into three functional zones, a strict protection area, a regular protection area, and a seasonal protection area. A strict protection area has relatively strict regulations in kind and in degree compared with other areas. The regulations are not uniform and rather at random by each zone and territory because of fully reflection of site specific conditions. So, the contents and descriptions of prohibited and allowable activities are quite different each other.

(2) Land Tenure

In terms of ownership, land in LWC is categorized into state land, township land, and private land (owned by physical persons or legal entities). An important aspect to manage LWC based on the environmental zoning is the right for private land owners to be compensated when imposing environmental requirements on their land use, especially for NPZ and AMZ. It is also concerned with state and local authorities responsible for carrying out conservation according to the existing laws and international obligations, because the right to be compensated might obstruct the possibility to establish a protected area like NPZ and AMZ in Latvia with scarce economic resources.

According to the Law on Land Use & Survey (1991) and the Law on Specially Protected Nature Territories (1993), private land owners have the right to demand compensation from the local government for financial losses resulting from the legal restrictions and obligations on their land. Tax exemption is one compensation form available. The central or local government has the right to purchase private land within a protected area. The problem is a lack of legal principles for compensation and how to consider private interests when establishing a protected area and determining environmental

restrictions/requirements. Therefore, it is appropriate to delineate NPZ as public land such as state land and township land because the nature preservation must be the first in this zone.

The next table shows the present land ownership in LWC by the proposed environmental zone, calculated based on the land tenure map as Figure 10.3.5. It indicates that the land ownership issue above mentioned will not occur in NPZ which is not owned by the private. While, AMZ of which private land occupies 18 % would be required some negotiation and agreement with the local land owners to set an actual regulatory plan for this zone.

Present Land Ownership of LWC

Ownership	NPZ		AMZ		DZ		Total by Ownership	
	Area (km^2)	%	Area (km^2)	%	Area (km^2)	%	Area (km^2)	%
State Land	178	96	178	68	112	30	468	57
Township Land	8	4	34	14	13	4	55	7
Private Land	0	0	48	18	243	66	291	36
Total by Zone	186	100	260	100	368	100	814	100

(3) Proposed Regulations in LWC

A regulatory plan must be simple and understandable both for decision makers and users. Too much as well as too weak regulations will distort its effectiveness and efficiency. It is crucial that the effective environmental management can not be achieved only by the regulatory plan. Well harmonized application of the regulatory plan and the facility plan is indispensable for implementation of EMP.

Since the regulatory plan for EMP needs to cover all types of proposed protection territories in LWC, it must be applicable for preparation of a site specific regulation of each protection territory. The major activities to be restricted in LWC are 1) Physical activities, 2) Pollution activities, 3) Ecological disturbance, and 4) Other activities.

Physical activities:

Physical activities cause direct impacts to the environment. The magnitude of impacts depends on scale, location, and duration. Most impacts usually affect natural environment seriously and some are irreparable. With regard to wetland conservation, change of regime on land and water should be paid careful attention, so the physical activities in NPZ should be strictly prohibited in principle. The permission oriented restriction would be suitable for AMZ because it includes 18% of private lands. In DZ, the notification oriented control could be appropriate for effective management of LWC.

Pollution activities:

Pollution activities usually bring about indirect impacts to the environment through deterioration and degradation habitats of fauna and flora. Possible pollution activities are wastewater discharge, waste dumping, and spraying of harmful substances and agri-chemicals. Damage caused by these impacts is not likely to be serious at first, but it could extend affected areas spatially and continue gradual contamination for a long time. Therefore, any pollution activities need to be strictly controlled in NPZ, and require a permission in AMZ and a notification in DZ. An environmental impact assessment system

of these activities would be useful for effective and efficient decision on management of LWC.

Ecological disturbance:

Ecological disturbance causes direct impacts to fauna and flora, and wet land ecosystem. Possible activities vary from economic to recreational and educational purposes. These activities are normally site specific and small scale, and somewhat to be linked with culture of the local society except for a large scale forestry and fishery. Thus, it could be appropriate to apply the permission oriented restriction in principle. A commercial based large scale forestry and fishery, however, should be prohibited in NPZ.

Other human activities:

Some human activities such as land use change, entrance, intrusion, and recreation which are not specified to wetland, should be regulated for conservation of nature and for wise and sustainable use of natural resources in LWC. These activities should be strictly prohibited in NPZ, and a permission is required in AMZ.

Considering the characteristics of LWC mentioned above, a regulatory plan by environmental zone in LWC is proposed as shown in Table 10.3.2. This plan must be a base for preparation of a concrete plan for each protection territory. It should be noted that the contents and methods adopted in the regulatory plan needs to be revised and modified based on the monitoring data and information related to the effectiveness of regulatory and facility plan in order to prepare more workable plan for effective implementation of EMP.

10.4 Organization and Institution for EMP

10.4.1 Organization for EMP

(1) Functional Frame

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

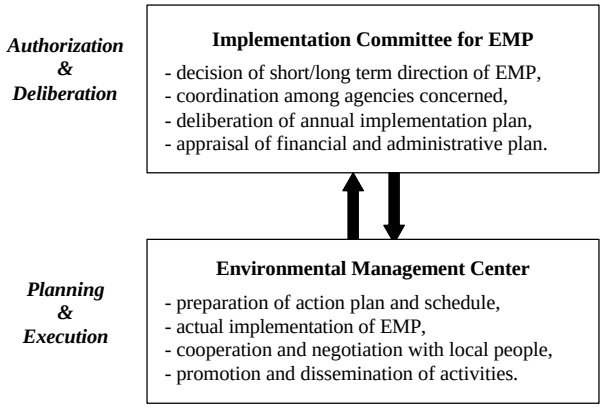
f) Eco-tourism promotion, and

g) Baseline for development and land use of LWC.

(2) Organization Frame

The EMP includes broad management components which will require high capabilities of coordination and actual management practice. The current official agencies concerned to EMP of LWC extend widely, such as the Rezekne and Madona REBs under MEPRD responsible for natural environmental, the Department of Planning under the District Council of four districts, and the Aiviekste Land Reclamation System Administration (ALRSA) under MOA responsible for operation and maintenance of water level control facilities. However, the current management system is lacking a core organization having the initiative, and this has caused difficulties for decision making and for taking aggressive actions. Therefore, to establish independent responsible organizations with clear right and power is considered to be suitable for actual implementation of EMP of LWC.

The EMP needs to cope with rather broad and complicated functions as mentioned above. It will require an integration and well coordination among official agencies and the local people concerned. Therefore, an establishment of the Implementation Committee (IC) and the Environmental Management Center (EMC) is proposed for actual implementation of EMP for LWC. The IC is a management authority of EMP which deliberates, authorizes, and coordinates substantial matters related to EMP, and the EMC is a site specific organization for actual implementation of EMP as shown below. These two organizations should be established before implementation of EMP because they will be required a lot of preparatory works including application of available soft (low interest rate) loan.



Overall Organization Frame of EMP

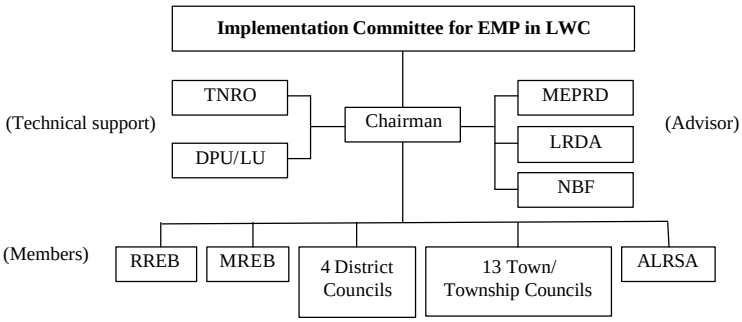
(3) Implementation Committee (IC)

Since a drastic institutional and organizational change might bring about some confusion in the current administrative system, a creation of an ad hoc Implementation Committee (IC) consisting of the agencies concerned can be practical for the time being. Its organization is proposed in the next figure. The IC should provide necessary physical, administrative and financial resources to EMC described below, and supervise its activities.

The IC consists of the regular committee members and the advisory group from MEPRD, National Board of Fishery (NBF), Latgale Regional Development Agency (LRDA),

District Councils, Township Councils, Madona and Rezekne REBs, and Aiviekste Land Reclamation System Administration (ALRSA). A committee chairman is to be selected among these members. Besides, IC requires scientific and technical supports from DPU, Teici Nature Reserve, and University of Latvia.

MEPRD would require a strong initiative to establish IC and to make it on right orbit with leading key members such as district councils and REBs. It should be, however, noted that the establishment of a new management authority is recommendable for actual implementation of EMP in the long term.



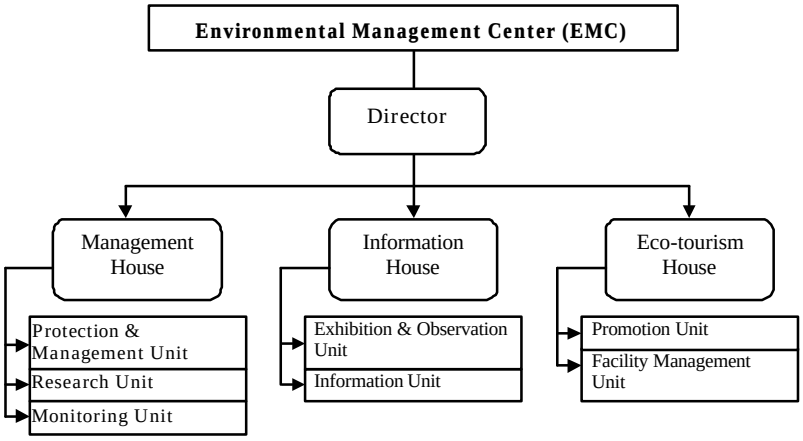
notes: RREB = Rezekne Regional Environmental Board
MREB = Madona Regional Environmental Board
LRDA = Latgale Regional Development Agency
NBF = National Board of Fishery
DPU = Daugavpils Pedagogical University, LU = University of Latvia
ALRSA = Aiviekste Land Reclamation System Administration of MOA
TNRO = Teici Nature Reserve Office

Organization Structure of IC

(4) Environmental Management Center (EMC)

The EMC has a role of actual implementation of EMP under the supervision of IC. EMC consists of three sections (tentatively named "House" in this report) which correspond to the components of EMP, namely the Management House, the Information House, and the Eco-tourism House. Each house has several units for actual implementation of responsible activities as shown below. Since some difficulties could be expected to actualize necessary actions in line with decisions made by committee members at the beginning, IC would be required to support EMC's concrete actions.

The Management House is responsible for a) biotope conservation including water level management, b) research of wetland ecosystem and its conservation, and c) monitoring and patrol. The Information House is responsible for preparation and dissemination of environmental information, and the Eco-tourism House is for promotion of eco-tourism and management of facilities to be used for eco-tourism. A building which has enough space and facilities should be provided for EMC, and its location would be the Idena area in Nagli township from strategic management viewpoint.



Organization Structure of EMC

10.4.2 Institutional Frame

In order to effectively and steadily implement the programs and projects proposed under EMP, the following five major institutional roles should be set up to realize wise and sustainable use of LWC and to manage the existing institutional difficulties.

(1) Initiative Role for Local People's Participation

The future figure of LWC fully depends on the will of the local people. It should create incentives for the local people to follow the EMP's directions and to be actively involved in its implementation in order to effectively implement EMP. Thus, the proposed organizations should incorporate opinions of the local people and the interest groups concerned to formulate the plan and to reflect their intentions on environmental conversation and future development in a harmonious manner. For this purpose, the organizations must arrange opportunities for public hearing meetings and publication on EMP, in association with NGOs and NPOs.

(2) Coordination Role between Environmental Side and Development Sector

The present economic disturbance in Latvia has given advantages on the natural environment of LWC, not adversely affecting them with little development progress. There is thus a risk that LWC will be fully used for economic activities and very few natural environment would remain as the regional economy goes on well in the future. Therefore, the organizations should have a power to coordinate between environmental and development incentives under the EMP's goals. But it is important that they are coordinated on the basis of due agreement among the various stakeholders related to LWC. For instance, the on-going land privatization can generate conflicts between further development and natural conservation in LWC. Any restrictions on land use and economic activities for nature protection require an agreement of landholders giving some incentives to them.

(3) Enforcement and Technical Role on Implementation

The concerned district and township councils have little knowledge and experiences in the development and conservation activities, and have limited enforcement capability to realize action programs as well as technical methods to actually implement them. It easily brings about more indifference and distrust to the EMP implementation among the stakeholders. The organizations should have rigorous and stable enforcement power and practical methodologies required for implementation of EMP.

(4) Environmental Monitoring Role for LWC

The scientific and technical information is required for effective implementation of EMP. The organizations should have a monitoring system consisting of periodic monitoring stations, systematic monitoring programs, monitoring technology, hard/software equipment, and skilled personnel. A well developed monitoring system will prove quality assurance and control procedures applied in the steps of the monitoring program. It is necessary to prepare an appropriate environmental monitoring program in LWC with the national and international standards.

(5) Environmental Education Role for Residents and Visitors

Pressures on the natural environment by economic activities of the people lacking in environmental awareness lowers the environmental quality of LWC. The general level of environmental awareness of the local people is relatively low in and around LWC. In order to accomplish the goals of EMP, it is therefore essential to grow environmental awareness of people not only using environmental resources in but also visiting LWC. The environmental education role of the organization ranges from training of environmental experts and eco-tourism guides, environmental orientation to local residents, visitors and school children, to dissemination of environmental information on a national and even an international level. Accumulated data and information through the EMP implementation including the environmental monitoring will be important sources to prepare educational materials.

Table 10.3.1 Summary of Latvian Nature Protection Territory

Name of Protection Territory	Lubana depressions (No.6)			Parabaine (No.8)			Pedegze river lower stretch (No.9)		
1. Major protection target	a)Natural environment, b)Habitat of rare and protected species c)Landscape and biotope of coastal area of Lake Lubana			a)Wetland complex (fungus, lichen, plant, animal), b)Habitat of rare and protected species c)Inundated grassland			a)Wet and decidious forest, b)Landscape and biotope		
2. Functional zones									
1) Strict protection area (St- A)	Restriction of human activities especially forestry			a)Protection of vulnerable and rare bird, b)Restriction of forest works			Protection of vulnerable and rare species And forest stands		
2) Regular protection area (Re-A)	Habitat protection of rare and protected species			Restriction of human activities (exploitation, bio-technical & recreational			Minimization of impacts caused by human activities		
3) Seasonal protection area (Se-A)	-			a)Gomelis area, b)Spring migration period of birds (ice melt season -			Nesting sites of Greater Spotted Eagle		
3. Area (ha)	5,905			9,822			4,150		
4. Restrictions	St-A	Re-A	Se-A	St-A	Re-A	Se-A	St-A	Re-A	Se-A
I. Prohibited activities									
1)Tree cutting	●	-	-	-	-	-	-	-	-
2)Any forest activity	●	-	-	●	-	-	●	●	-
3)Cutting trees from edge to center	●	●	-	-	●	-	-	●	-
4)Large scale deforestation of state land	●	●	-	-	-	-	-	-	-
5)Clear and selective zone tree cutting	●	●	-	-	-	-	-	-	-
6)Reforestation & cranberry planting	-	-	-	●	-	-	-	-	-
7)Damaging biotope, fauna & flora, and habitat	●	●	-	●	-	-	●	●	-
8)Capture & collection of fauna & flora	-	-	-	●	-	-	-	●	-
9)Introduction of exotic species	-	-	-	●	-	-	-	-	-
10)Hunting water birds applying toxic shell	-	-	-	-	●	-	-	-	-
11)Damaging landscape	●	●	-	●	-	-	-	●	-
12)Land use change	-	-	-	●	-	-	-	●	-
13)Construction of drains, roads, power transmission linse, and buildings	●	●	-	●	-	-	-	●	-
14)Application of fertilizers, pesticids and chemicals	●	●	-	●	-	-	-	●	-
15)Grass cutting	●	●	-	-	-	-	-	●	-
16)Construction of educational trails and view sites	-	-	-	●	-	-	-	-	-
17)Waste dumping	-	-	-	●	-	-	-	●	-
18)Change of surface & groundwater level	-	-	-	●	-	-	-	●	-
19)Mining & quarries	-	-	-	●	-	-	-	●	-
20)Activities causing soil erosion	-	-	-	●	-	-	-	-	-
21)Recreation and sports use	-	-	-	●	-	-	-	-	-
22)Driving by water motorbike	-	-	-	-	●	-	-	-	-
23)Dwelling	-	-	-	-	-	●	-	-	●
24)Driving (Apr. 1- Sept. 1)	-	-	-	-	-	-	-	-	●
II. Allowed activities									
1)Hunting (except Common Snipe)	◎	◎	-	-	-	-	-	-	-
2)Hunting complying relevant laws	-	-	-	◎	◎	-	◎	-	-
3)Conservation activities	◎	◎	-	◎	◎	-	-	-	-
4)Visits for protection & research	◎	◎	-	-	-	-	◎	-	-
5)Visits for recreation	-	◎	-	-	-	-	-	-	-
6)Visits for education	-	◎	-	-	◎	-	◎	-	-
7)Picking berries & mushrooms	◎	◎	-	◎	◎	-	◎	-	-
8)Fishing & angling complying relevant laws	-	-	-	◎	◎	-	◎	-	-
9)Grass cutting	-	-	-	-	◎	-	-	-	-

Note: ●：Prohibited activity, ◎：Allowed activity, -：No description

Source: Regulations on Nature Protected Areas (June 1999), Regulations of the Cabinet Ministers No.212/1999

Table 10.3.2 Regulatory Plan by Environmental Zone

Activities	Environmental Zone		
	NPZ	AMZ	DZ
I. Physical Activity			
1) Building & facility construction	●	○	X
2) Land development and topographical change	●	○	X
3) Mining & quarring	●	○	X
4) Reclamation	●	○	X
5) Road construction	●	○	X
6) Cultivation	●	○	X
7) Telecommunication and transmission line	●	○	X
8) Change of water level	●	○	X
9) Dredging & water drainage	●	○	X
10) Navigation	●	○	X
II. Pollution Activities			
1) Wastewater discharge	●	○	○
2) Solid waste dumping	●	○	○
3) Storage of pollutants and harmhul substances	●	○	○
4) Spraying agri-chemicals & harmful substances	●	○	○
III. Ecological Disturbance			
1) Capture & collection of fauna	○	○	-
2) Collection of trees and forest products	○	○	-
3) Research and monitoring	○	X	-
4) Educational use	○	X	-
6) Tree cutting and planting	○	X	-
7) Grass cutting and planting	○	X	-
8) Introducing & Stocking endemic species	○	○	-
9) Hunting	○	○	-
10) Angling & fishing	○	○	-
11) Commercial forestry	●	○	X
12) Commercial fishery	●	○	X
IV. Other Human Activities			
1) Land use change	●	○	-
2) Dwelling	●	○	-
3) Intruding on foot (exept for carnberry picking)	●	-	-
4) Intruding by car and motorbike	●	○	-
5) Intruding by motorboat	●	○	-
6) Burning	●	○	-
7) Camping & firing (except for designated place)	●	○	-
8) Other recreational use	●	○	-
9) Agriculture and Pasturing	●	○	-

Note: ●：Strictly prohibited, ○：Permission required, X： Notification required, -：No restriction

NPZ: Nature Preservation Zone, AMZ: Active Management Zone, DZ: Development Zone

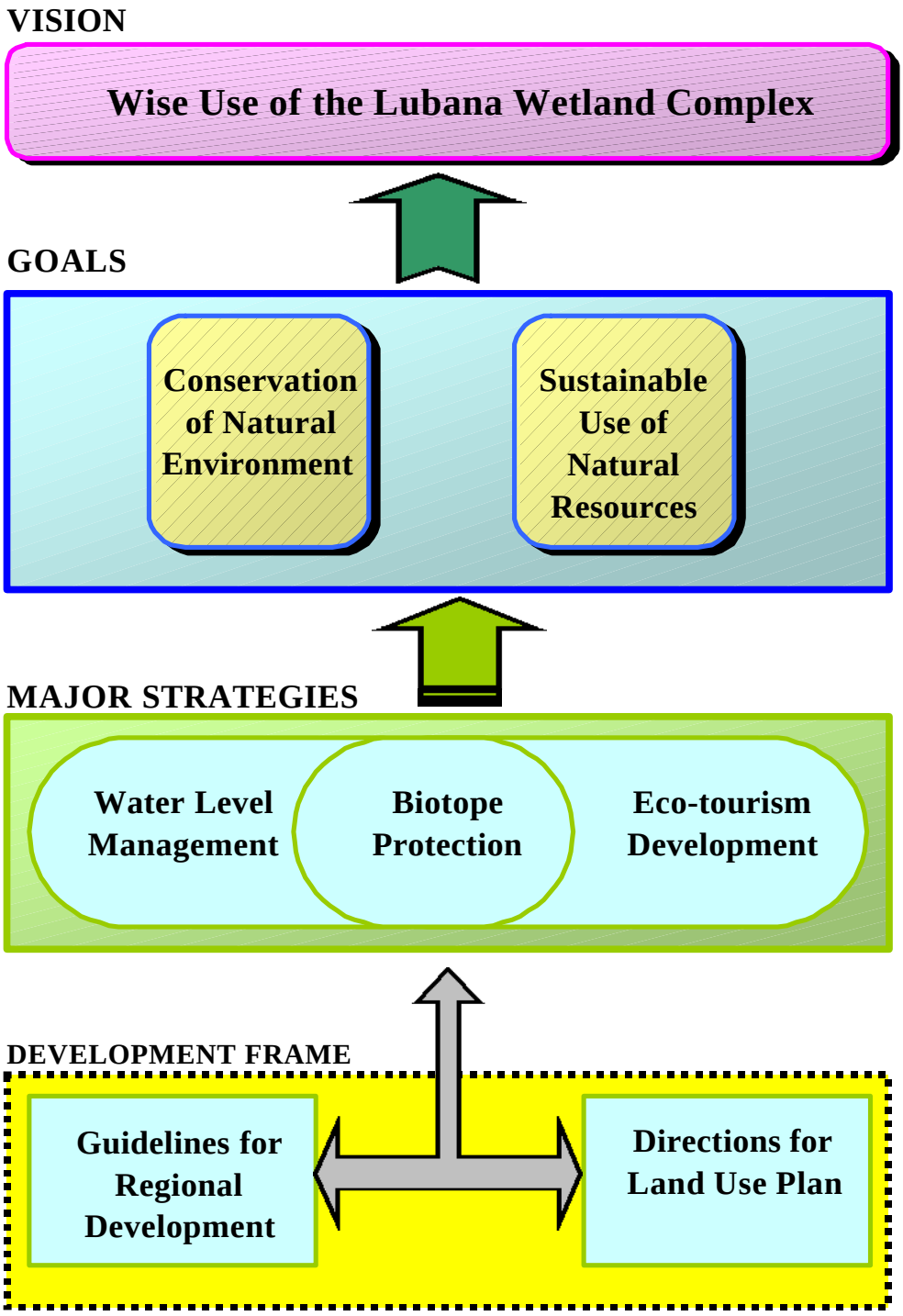


Figure 10.2.1 Concept of Vision and Goals of the Environmental Management Plan

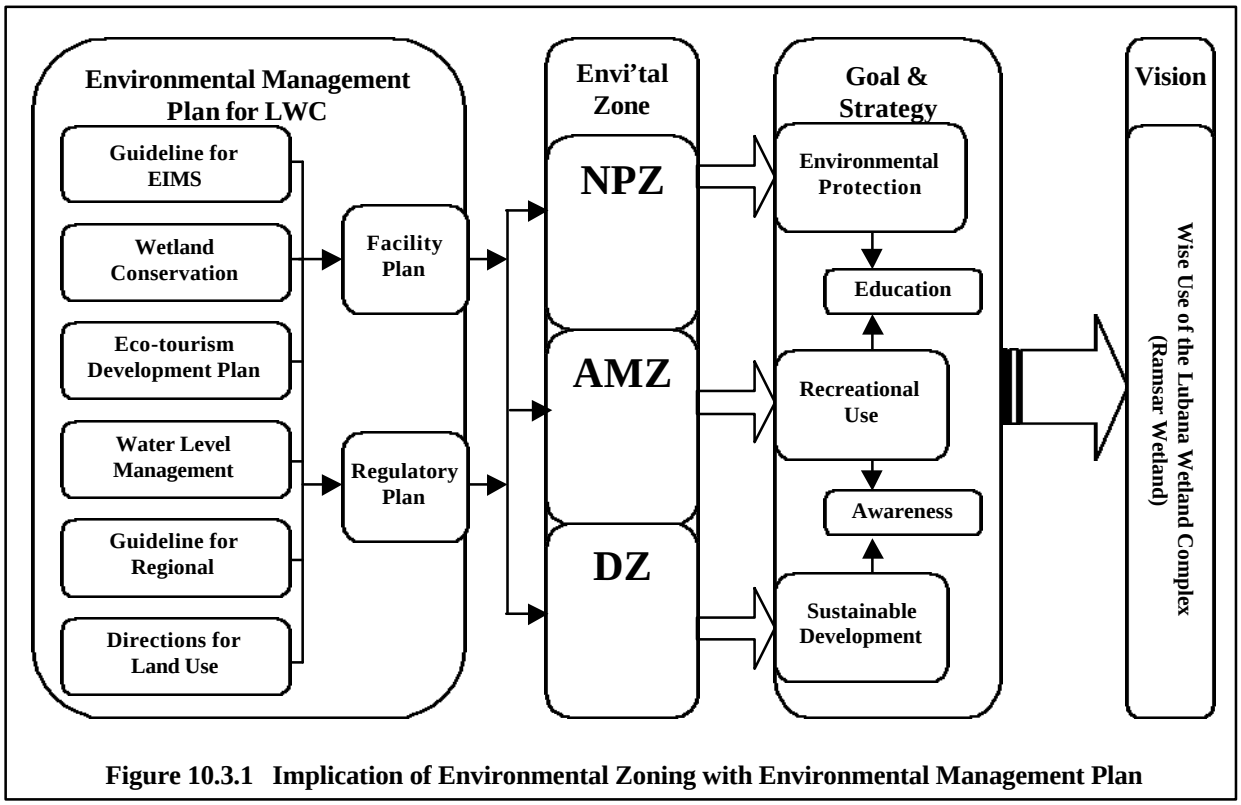


Figure 10.3.1 Implication of Environmental Zoning with Environmental Management Plan

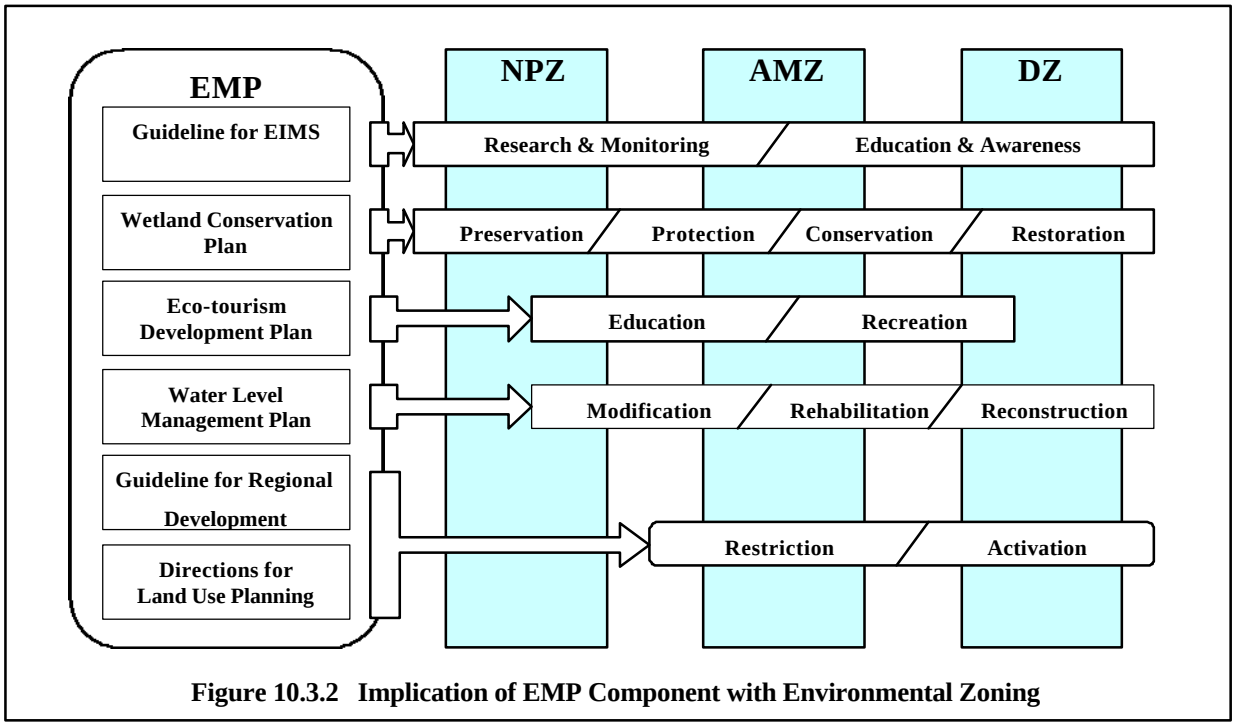


Figure 10.3.2 Implication of EMP Component with Environmental Zoning

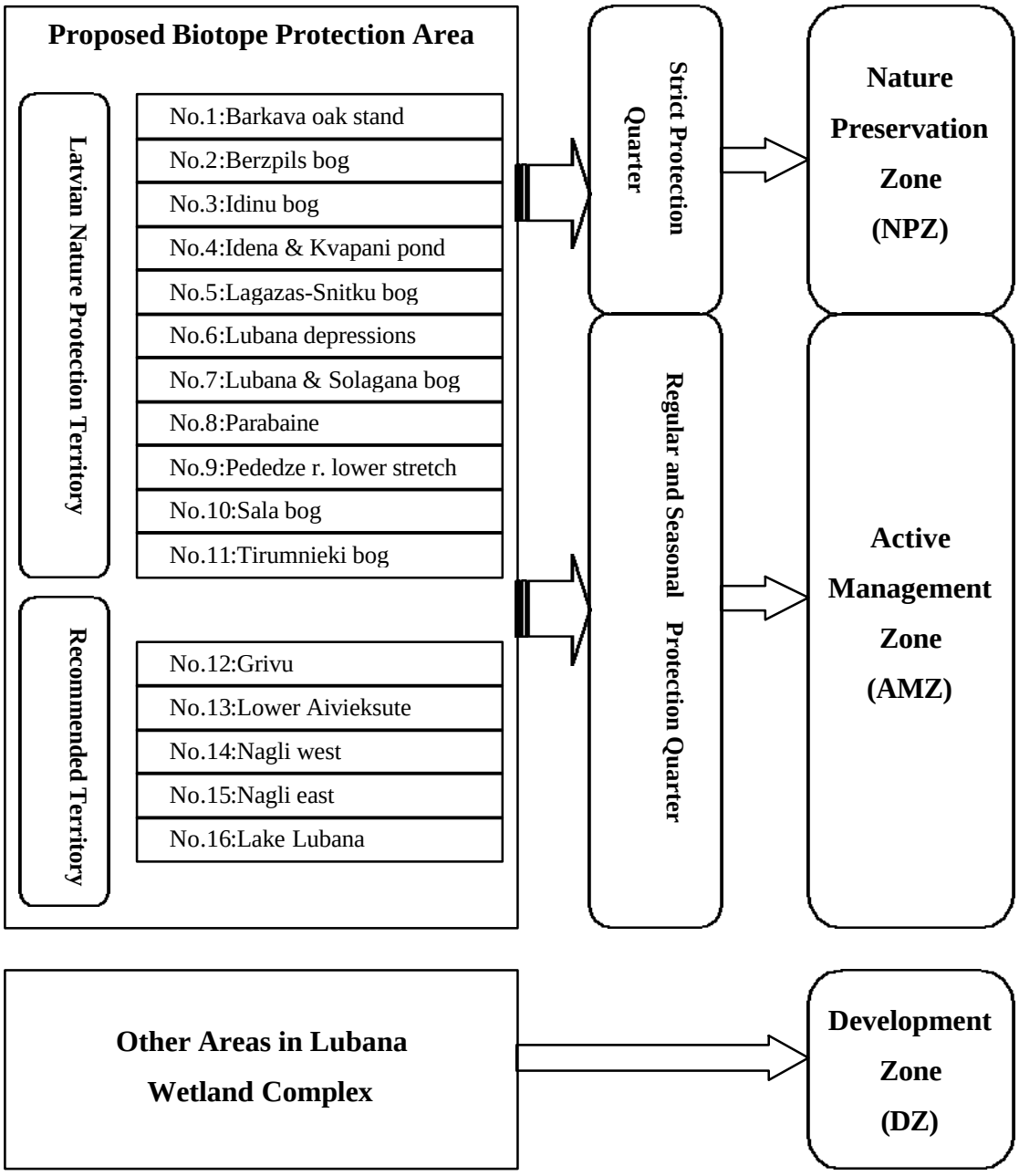


Figure 10.3.3 Environmental Zoning in LWC

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

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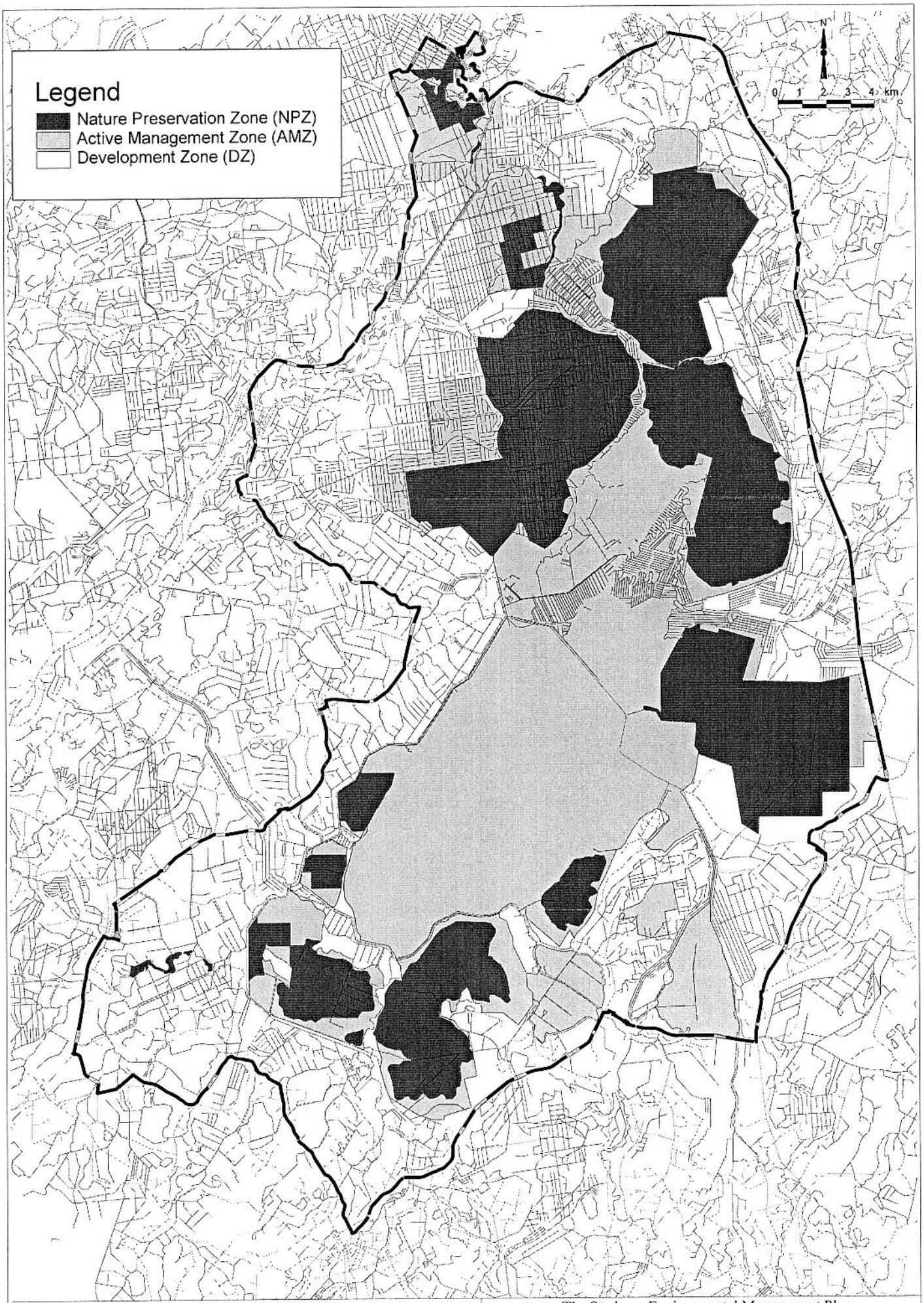

Figure 10.3.4 Environmental Zoning Map

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

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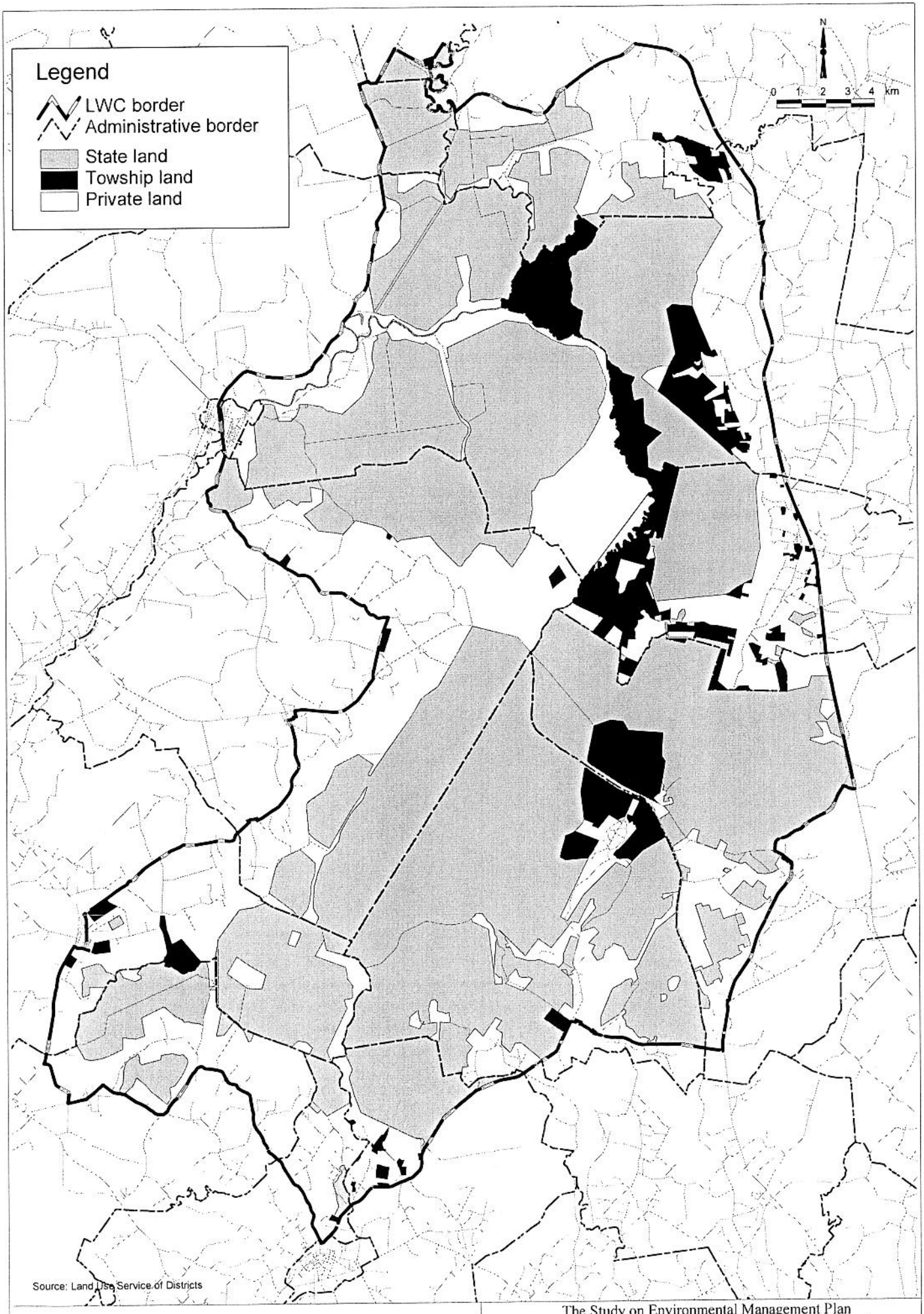

Figure 10.3.5 Land Tenure Map

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

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