



CONFERENCE READER



10th International Living Lakes Conference 2005

15-19 May 2005
Tagaytay City, Philippines



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Stewardship, Participation, and Co-management: Strategies for the Conservation of the World's Rapidly Dwindling Natural Resources

Prof. Dr. Manfred Niekisch

Vice President

German League for Nature and Environment (DNR)

University of Greifswald

Bachstrasse 11-12

17489 Greifswald

Germany

E-Mail: niekisch@uni-greifswald.de

The IV. World Congress on Protected Areas, organized by IUCN's World Commission on Protected Areas in the year 2003 in Durban, sent out a strong message to the world: Protected areas have to bring benefits to local people, even beyond boundaries. Otherwise they are not likely to be able to withstand the pressures coming from the surrounding areas which very often show signs of overexploitation and where natural resources are decreasing rapidly. At the same time it is impossible to put under protection all those areas which are still left in natural conditions.

Consequently ways have to be found to manage protected areas in such a way that they contribute to human welfare and to the reduction of poverty, and at the same time to manage nature and its resources outside protected areas so that they can fulfil their functions for the human society without losing their autochthonous biodiversity. In both cases, inside and outside protected areas, such an integrated approach needs the cooperation of government authorities, the civil society and increasingly also the corporate sector.

Stewardship, participation, and co-management are multi-faceted terms and can be interpreted in many ways. It depends very much on the social, cultural and ecological context how they can be designed and implemented successfully although of course certain global standards have been identified. Co-management and participation have also proven to be valuable instruments for the resolution of conflicts related to restrictions imposed by governments on the use of land and other resources.

A relatively new instrument is the payment for environmental services. It can generate income when for example an organisation of inhabitants of a water catchment area receives money from those benefiting from the water further downstream. Case studies from different parts of the world show the positive results that can be achieved when local people are given responsibility and the capacity to manage the resources in their surroundings. On the other hand there are responsibilities and duties on the government's side which cannot be delegated to private organisations and groups, such as law enforcement or the creation of a legal basis for participation and co-management. Flow charts have been elaborated and will be presented which show the different perspectives and levels of participation (participation as a means/ participation as an end), as well as the main factors influencing participation.



**The Concept of Water
Quality Management Area:
Its Application to the Laguna de Bay Region**
Dolora N. Nepomuceno

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The Concept of Water Quality Management Area: Its Application to the Laguna de Bay Region

Dolora N. Nepomuceno

*Assistant General Manager
Laguna Lake Development Authority*

Abstract

The Laguna de Bay is one of the largest inland bodies of water in Southeast Asia and the largest in the Philippines. The lake watershed comprises 24 micro-watersheds encompassing 66 local government units and where over 50 water-related government entities operate. The Lake, while supporting a range of uses and holds the greatest potential as source of domestic water supply including drinking water, is confronted with environmental threats. As the apex institution for managing and coordinating the development of the lake and its watershed, the Laguna Lake Development Authority (LLDA), operates under a unique legal and institutional framework as well as an approach that are anchored on the concept and principle of integrated watershed believing that only the watershed perspective can fully account for the complexity of bio-physical, socio-cultural, economic, political and political factors that impact on the natural environment. Therefore, the lake's 24 micro-watersheds represent LLDA's basic units for planning and implementation of environmental improvement and conservation measures.

LLDA's watershed approach has been given more impetus with the enactment of the Clean Water Act under Republic Act 9725, undoubtedly a milestone Philippine legislation. In relation to the Charter of the LLDA, it recognizes the uniqueness of the Laguna de Bay watershed as a distinct ecosystem. The law designates the Laguna de Bay Region as one Water Quality Management Area (WQMA) under the administration of the Authority in accordance with its Charter (RA 4850 as amended). WQMA as used in the CWA refers to "physiographic units such as watershed, river basins or water resources regions ... having similar hydrological, biological and meteorological or geographic conditions which affect the physico-chemical, biological and bacteriological reactions and diffusions of pollutants in the water bodies". It may also refer to a cluster of LGUs which "share common interest or face similar development programs, prospects, or problems." Compared to the other concepts of WQMA in the law, the Laguna de Bay watershed fits well, from the administrative and technical viewpoints, into the watershed-focused WQMA as envisioned in the CWA.

However, the CWA sets the conditions for this legal framework to be operationalized in the Laguna de Bay Region: (i) the standards promulgated and the wastewater charge system established under this Act shall be enforced in the Laguna de Bay WQMA; (ii) formulate a WQMA Action Plan that will embody the strategies to coordinate policies necessary for the effective implementation of the CWA based on the established framework and monitoring the compliance to the plan; and (iii) structurally, creation of multi-sectoral group to effect water quality surveillance and monitoring network, and a Technical Secretariat to provide technical support to the Governing Board. For purposes of the CWA, the LLDA Board of Directors serves as the WQMA Governing Board. In addition to LLDA's best practices and lessons learned over a period of more than 35 years on natural resources and watershed co-management, currently underway are interventions and measures to enable the LLDA to transit into a CWA-mandated WQMA, as yet another precedent-setting and trailblazing undertaking in the field of integrated watershed management as a re-engineered LLDA.



CONSTITUENCY BUILDING AND PROTECTED AREAS MANAGEMENT BOARD – TAAL LAKE

Maria Paz G. Luna

CONFERENCE READER



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Constituency Building And Protected Areas Management Board – Taal Lake

Maria Paz G. Luna

Tanggol Kalikasan, Inc. and Pusod, Inc.

Pusod, Inc.

*201 Mediatrix Rd., Miracle Heights Subd.,
Antipolo Del Norte, Lipa City, Batangas 4217*

Tel Nos. (63)(43) 757-3192

(63)(43) 757-3996

www.pusod.org

Taal Lake is one of the more famous scenes in the Philippines, present in postcards, elementary schoolbooks and ecotourism brochures. Visitors to Tagaytay Ridge get treated to the awesome vista of the deepest lake in the Philippines (172 m) and the third largest in area (234.2 km²), but the real wonders of the lake far, far surpass the mere beauty of the scenery.

The lake is highly important in biodiversity terms, with endemic species in various families. About 4 species of endemic fish thrive in the lake. The most important is clupeid (*Sardinella tawilis*), which is the basis of subsistence fishery among the coastal populace. The fish fauna also includes important migratory components composed mainly of mullets (*Mugilidae*) and jacks (*Carangidae*) which move up the Pansipit River when juvenile and spend their lives in the lake until they are sexually mature, at which time they return to the sea. These fishes also support valuable fisheries, but the indications are that their numbers have been declining due to over-fishing the Pansipit River and fishcage development along its banks. Two instances of demolition of the illegal cages have been initiated, in 1997 and again in October 2001.

Major threats to the lake include over-exploitation of fishery resources, inappropriate development for tourism and subdivision development on the Tagaytay ridge area, and an increasing floating cage culture of *Oreochromis nilotica* likely threatening the endemic species and causing pollution from excess feed.

It is not only the biological and evolutionary importance of Taal Lake that is shrouded in secrecy by reason of lack of study and discussion. It is also its mysterious geologic, archeological and social history. During the 10th century, it was allegedly connected to the sea at Balayan Bay by a wide channel, but an extremely powerful eruption of the Taal Volcano in 1754 rearranged the shape of the lake and narrowed the outlet to form the present day Pansipit River, the lake's

only outflow, which leaves the lake in its southwest corner and travels about 10 km to the sea.

Formerly called Bombon Lake, the name Taal was from the town that used to be on the coast of the lake until the channel connecting it to the sea closed. Six of the volcano's 24 known eruptions since 1572 have caused fatalities, many from tsunamis in the lake. At least four ancient towns lie submerged and mostly unexplored in the lake. Its major 1965 eruption that killed at least 150 people and was followed by frequent explosive activity until 1970. Minor phreatic activity resumed in 1976 and again in late 1977. This volcanic activity almost certainly affected the evolutionary patterns of the endemic species on the lake.

The only entity that has undertaken management planning in TVPL was the Presidential Commission on Tagaytay-Taal created in 1993 but abolished in 2000. By virtue of a Presidential Proclamation, the lake basin was designated as a protected landscape under the National Integrated Protected Areas Act. The Protected Area Management Board was set up in the late 90's overlapping with the functions of the Commission. In 2000, the Commission was abolished but the PAMB has not been able to fully take over its functions and fully implement the management plan created. By then, active fishing gear has become rampant and fishcages have proliferated even in the declared sanctuary. The resulting spate of executive action in the 90's creating three management authorities merely confused rather than integrated the responses to the issues.

The confusion in legal mandates include the creation of (1) a Protected Area Management Board (PAMB) under the protected areas law, (2) an Integrated Fisheries and Aquatic Resources Board under the Fisheries Code (IFARMC), and (3) a Lakewide Development Council created by the provincial government. 9 towns and 2 cities also share the governance of the lake which rely strongly on the Local Government Code and to assert their authority over their areas in the lake. Currently, the Protected Area Management Board has 25 appointed members while the law specifies a membership of 200 considering the area covered. A conservation project is underway to convene the members as required by law and to find common ground for lake management and conservation.

Taal Lake is the Philippines' deepest lake and third largest, yet very few initiatives have been undertaken for its conservation. Major threats to the lake include over-exploitation of fishery resources, development for tourism, and solid waste and agricultural runoff. A lakewide community-based organization of small fisherfolk called the Kilusan ng Maliliit na Mangingisda sa Lawa ng Taal (KMMLT) has been active in conservation issues for the past two decades. management mandates in several levels has resulted in a confused management regime. A Presidential Commission for managing the lake had only a three year lifespan. As a protected area, a management board (PAMB) was created but had 25 instead of the 200 members as required by law. A recent conservation project aims to convene the full 200 members as a means to increase constituency, increase capacity and affirm the legal mandate of the PAMB.



THE LAGUNA DE BAY INSTITUTIONAL STRENGTHENING AND COMMUNITY PARTICIPATION (LISCOP) PROJECT

Joey Cariño

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THE LAGUNA DE BAY INSTITUTIONAL STRENGTHENING AND COMMUNITY PARTICIPATION (LISCOP) PROJECT

Within the context of the socio-economic significance of the Laguna de Bay and its increasing environmental deterioration, the Laguna de Bay Institutional Strengthening and Community Participation Project (LISCOP) is being implemented through a loan from the World Bank and grant from the Netherlands Government. A five-year development initiative (2004-2009), the LISCOP is designed to support co-managed investments that will benefit 66 Local Government Units in the watershed and support the institutional strengthening of the LLDA, LGUs and River Councils in ensuring the sustained and effective management of the Laguna de Bay.

The LISCOP specifically aims at improving the environmental quality of the Lake through direct micro-watershed interventions and ensuring effective development governance necessary to meet the demands for a more integrated resource management to safeguard the Lake's ecological integrity.

To support the strategic orientation of the LISCOP, two major interventions, which also form LISCOP's critical components, will be implemented. These are:

Component 1: Co-managed Investments for Watershed Development - will support on-lending to multiple LGU borrowers to implement micro-watershed environmental sub-projects. The demand driven, open menu of environmental interventions (sub-projects) that may be implemented broadly fall under the following general themes, Waste Management and Sanitation; Forestry, Inland Waters and Biodiversity (Natural Resource Management) sub-projects; Eco-tourism; Soil Erosion and Localized Flood Prevention.

Component 2: Strengthening Institutions and Instruments. This consists of capability enhancement support to the LLDA, LGUs River Councils and community groups. The enhancement of the institutional capability of the LLDA, to be carried out along three major activities, is expected to result in the improvement of the delivery of its policy-making, regulatory and developmental mandate. These activities include: Improving Regulatory Instruments and Approaches; Strengthening Policy and Planning; Formulating a Strategy for Trunk Infrastructure.

The Project Area

The developmental, institutional and direct micro-watershed interventions are to be implemented within the Laguna de Bay region, which is the largest inland water body in the Philippines and one of the largest lakes in Southeast Asia. While the Lake and its watershed accounts for only 1.3% of the country's total land area, it covers the provinces of Rizal and Laguna and portions of the provinces of Cavite,

Batangas and Quezon and Metro Manila. It is host to a total of 66 local government units (51 municipalities, 10 cities and 5 provinces) and is home to approximately 10 million people.

The lake supports a host of beneficial uses including fisheries and it is currently being eyed as a major source of drinking water for Metro Manila in the immediate future. Over the recent decades however, uncontrolled population growth, indiscriminate deforestation and land conversion, intense fisheries, widespread industrialization and urban sprawl have produced massive changes in the Laguna de Bay and its watershed. The resulting problems relate to solid waste management, sanitation and public health, congestion, rapid siltation, unmitigated input of domestic, agricultural and industrial wastes, deteriorating water quality, flowing problems and loss of biodiversity.

The Micro-Watershed Approach

Environmental action planning and sub-project implementation adopts the micro-watershed or the sub-basin approach. As the basic planning framework for LISCOP interventions, the micro-watersheds allows for a holistic appreciation of the interplay of natural and man made processes within that given ecological space.

The LLDA has delineated 24 micro-watersheds within the larger Laguna de Bay Basin. As a strategy for optimizing sub-project level interventions to the lake and its watershed, the LISCOP provides the framework of cooperation that will enable multiple LGUs to jointly implement sub-projects cutting across system boundaries. The multiple LGU borrowing framework to be adopted under Component 1 of the LISCOP is considered one of the strategies to actualize LISCOP's participatory governance for a micro-watershed approach to improving the quality of the Laguna de Bay and its watershed, where two or even more LGUs, depending on the natural configuration of a given micro-watershed, can act as one sub-project sponsor and become jointly responsible for the implementation of sub-projects on the ground.



Environmental Management for Local Communities

Marion Hammerl – Resch

CONFERENCE READER



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Environmental Management for Local Communities

Marion Hammerl

Bodensee-Stiftung (Lake Constance Foundation)

Fritz Reichle-Ring 4

78315 Radolfzell, Germany

E-mail: marion.hammerl@bodensee-stiftung.org

www.bodensee-stiftung.org

www.ecolup.info

Model-Project ECOLUP: Environmental Management for Land Use Planning

With 147 inhabitants per square kilometre, the European is among the most thickly settled regions in the world (European Commission: Caring for our future, 2000). Here, the built-up surface area increases by 2% every ten years. Aspects of the substantial impact on nature and the environment are: the release of environmental pollutants into the soil, the air and water, increasing traffic volume, excessive settlement of the landscape and natural habitats.

The Lake Constance region represents one of the agglomeration areas in Central Europe within which the environmental problems caused by settlement development can be clearly seen. It offers valuable natural areas and land cultivated by man, high quality of life for living and working, but also the responsibility for the protection of the drinking water reservoir for 4.5 million people. With 289 inhabitants per square kilometre, the Lake Constance district lies above the EU average. Areas that lie near the lake are particularly desirable - up to 500 inhabitants per km² live there. It is attractive to live and work on the lake and this is not going to change in coming years. This means that the communities of the region must take particular care to preserve local natural resources, especially the finite resource land.

Together with the cities of Constance, Überlingen and Dornbirn and the municipality (Marktgemeinde) of Wolfurt and within the framework of the EU Life-Programme, the Lake Constance Foundation has put together a model project centred on ecologically oriented land use planning. The Institute of Applied Research at Nürtingen University was responsible for the supervision of the scientific aspects of this project, which was carried out from July 1st, 2001 through March 31st, 2004.

ECOLUP (Ecological Land Use Planning) provides a framework within which the European Environmental Management System EMAS II can for the first time be applied to the processes in communal urban land use planning. Through the implementation of EMAS, the environmental impact of communal urban land use planning can be represented in a measurable fashion and the continual improvement of the quality of the environment ensured. The exchange of information between communities and an improved inclusion of local residents and other representatives of interest groups are also among the project's primary aims.

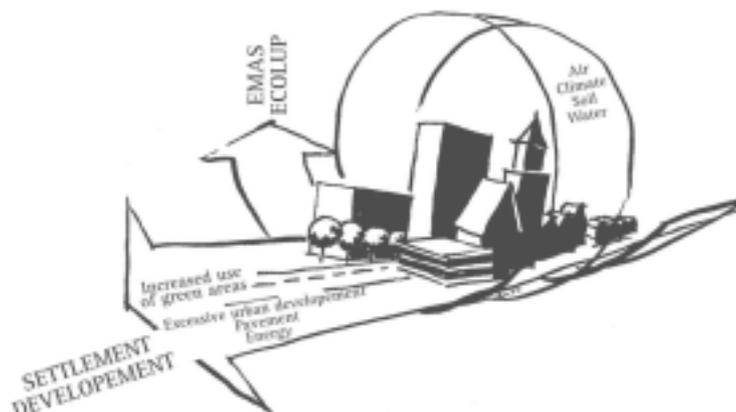
Environmental Management for Local Communities: How can it work?

The European Eco-Audit (EMAS) and ISO 14001 are voluntary management systems for businesses and organisations that wish to improve their operational environmental protection measures on a continual basis beyond the practices called for by law. EMAS and the international ISO 14001 environmental management system are very similar in structure and contents.

All organisations participating in EMAS or ISO 14001 regularly draw up an environmental statement for the public. In it, the organisational environmental policy and its environmental programme with concrete environmental goals are established in connection with a complete depiction and evaluation of as much quantitative data as possible reflecting the programme's direct and indirect impact on the environment. Each environmental statement must be evaluated by an independent, government-certified environmental verifier. If it meets the requirements of the EC eco-audit ordinance, the environmental auditor declares the environmental statement to be valid.

At present, EMS systems have been implemented into production processes, organisational locations or services. Only in a very few cases they have been applied to municipal planning processes. Within ECOLUP the environmental management system EMAS has been applied to communal urban land use planning:

The municipal administration as the institution directly responsible for the process

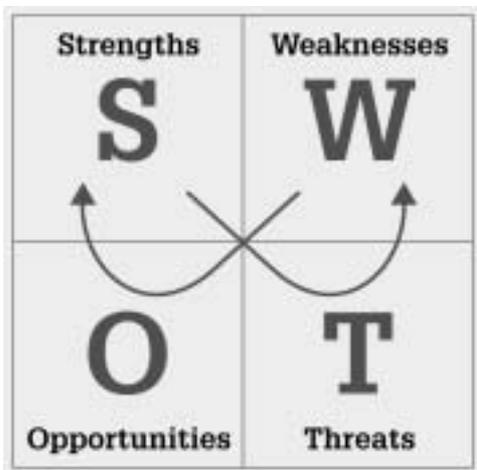


of urban land use planning undergoes validation. Executive instances within the municipal administration are the specialised departments and offices (building control office or department of city planning), the town council and the mayor. Further specialised and informal plans can also be taken into consideration.

Procedure to implement EMAS or ISO 14.001

EMAS or ISO 14001 can be applied to communal urban land use planning under the following conditions: communal urban land use planning must take influence on the given environmental aspects, the community must be able to influence land use planning, and, finally, the community must be able to involve its citizens and representatives of other interest groups and to establish a monitoring system.

Environmental Assessment



EMS requires as a first step an environmental assessment. A appropriate instrument is the to realize this review is the SWOT-analysis. A SWOT-analysis is a useful method for conducting a qualitative analysis of the data and information on the relevant environmental aspects. In addition, these aspects were categorised as either directly or indirectly affecting the environment and the most significant among them were identified. The communities need to collect all available information and reference data to define their actual situation in the most important

environmentally-relevant areas. In the case of environmental aspects for which no current reference figures were available, an exclusively qualitative evaluation will be carried out. On the basis of the SWOT-analyses within ECOLUP, the most significant environmental aspects to be used throughout the project were identified:

- land consumption
- sealing-over of soil/use of green areas
- transportation and mobility
- energy and climate
- landscape development

In order to create a basis for a grounded and reliable evaluation of a community's environmental situation, it should make an addition contribution the SWOT-analysis by compiling a table of reference figures reflecting current conditions. These reference figures should whenever possible be contrasted with those of other communities or with standard values so that the community can see in which areas improvement is needed.

Environmental Policy, Environmental Goals, and Environmental Programme

Each community should create an environmental team consisting of representatives from specialised departments and offices, regional authorities, the business sector, environmental organisations and citizen's initiatives. The responsibility of the environmental team is the elaboration of a draft of the Environmental Programme which includes environmental goals and the concrete measures to be undertaken in achieving them. Within ECLUP, the environmental programme was developed and discussed in five topical workshops. The overarching aspect citizen involvement / participation was discussed in a workshop of its own, where goals and measures for the improvement of participation were established. Experts and regional authorities provided background information and indicated potential for political action. The environmental programme is a decisive element of EMAS and ISO 14.001, for on the basis of its contents, the mid- and long-term benefits for the environment (continual improvement) are determined.

The environmental policy includes a commitment of the community to achieve continual improvement of the environmental quality of their urban land use planning and summarise the most important goals within this context. The environmental policy and programme are to be made accessible to the public by means of an environmental statement.

Compliance Audit and Management Structure (System Audit)

EMAS and ISO 14.001 require an index that includes all legislation relevant to the environment that the community is obliged to observe and that is updated at regular intervals. In the so-called compliance audit, the community's conformity to legal standards, i.e. the observation of this legislation, is assessed.

To work successful, an Environmental Management System needs an appropriate management structure. It is important to adapt the structure to the existing organisation and not the other way around. Key elements for the management structure are:

Leadership (Mayor and Municipality Council): Approves environmental policy and Environmental Programme. Signs Environmental Report.

Management coordinator: Coordination of SWOT-Analysis, coordination of elaboration and implementation of environmental programme, coordination of reports and documentation, realization of internal audits, coordination and publication of environmental report, coordination of external audit.

Environmental Team: Supports coordinator regarding SWOT-Analysis, elaboration and implementation of environmental programme, internal audits, and environmental reports.

Management should keep its documentation to the minimum while making it as informative as possible. Records should however be explicit showing by whom, for whom, when it was produced and where it can be found. All staff members should have access to the relevant information, preferable in form of a handbook.

The action of staff directly influences the environment where they work can have a positive or negative effect. Well trained employees are more motivated and will make better decisions. Management should emphasise the importance of good training for its field staff and insist on good communication. Management should also define who is responsible for the dissemination of information to the staff and to the public. EMAS obliges the municipality to publish an environmental report. Within ISO 14.001 it is not an obligation, but anyway, it is very much recommended to publish an environmental report and a periodic actualisation.

Monitoring and Audits

Management is a cyclical process involving planning, allocation of resources, implementation, monitoring and evaluation, and feedback. Monitoring and evaluation is crucial to effective management. Within EMAS and ISO 14.001 periodical internal audits (at least yearly) are required. EMAS and ISO 14.001 require also an assessment by an independent, certified environmental verifier (minimum every three years). It is only after this person has "validated" the management system that it may be termed an approved environmental management.

For evaluation and monitoring it is important to agree on a set of core reference data. This data should be meaningful and relatively easy to obtain during a long-term period. They should cover all relevant environmental aspects. Most of the reference data indicate a status quo and must be adapted to serial data or a benchmarking system so that the improvement in environmental performance can be shown.

Within ECOLUP, Nürtingen University identified a core set of 16 reference figures by means of which the achievement of sustainable development within communal local land use planning can be measured in order to quantify the goals set and to provide a means of checking the effectivity of the measures undertaken. For example, reference figures are calculated on the percentage of land used for various purposes and the intensity of that use, the degree to which soil has been sealed off, to what extent green areas have found use in various areas, to what

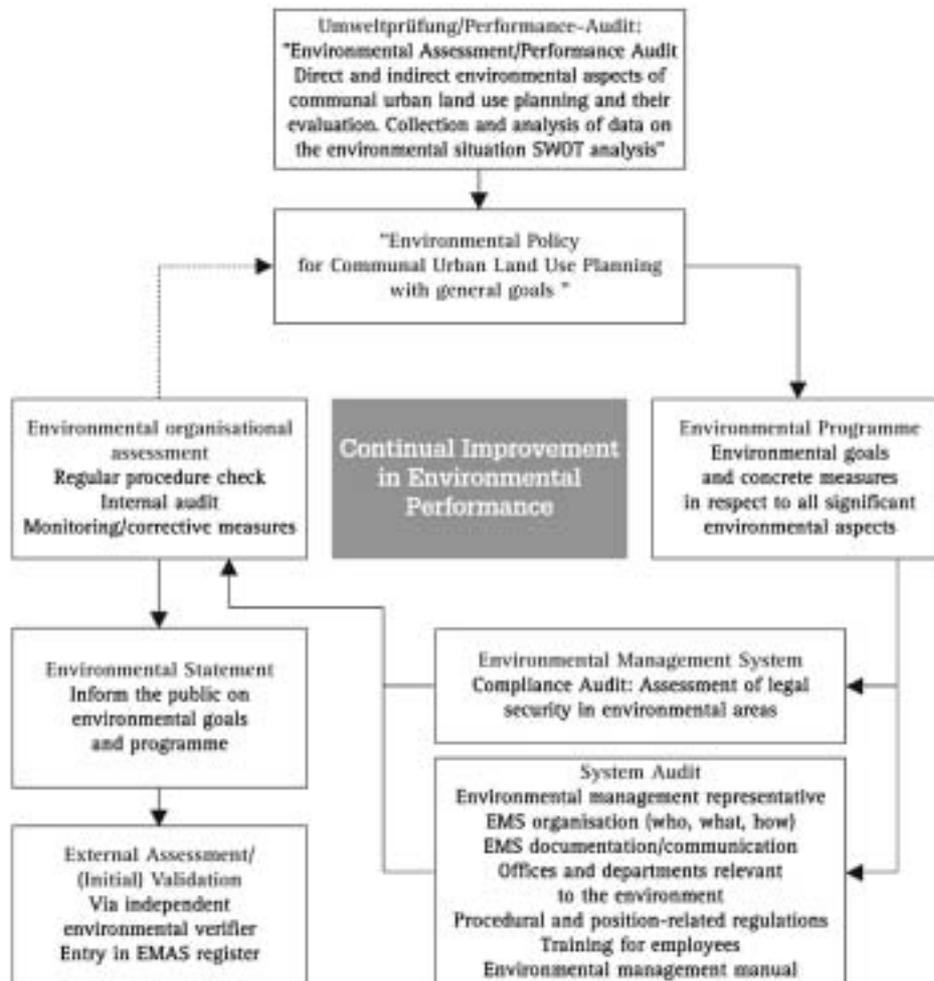
extent land use potential has been exhausted, the percentage of regenerative energy of total energy use or the percentage of protected areas within the community.

These reference figures are easy to calculate and provide a great deal of relevant information. Further reference figures are provided in a list of environmental aspects to be found in the ECOLUP guidance.

ECOLUP Guidance

Among the most important instruments for communicating the project results is, along with the pool of knowledge available at the website, the ECOLUP Guidance. In the course of its 120 pages, the manner in which all elements of an environmental management system in accordance with EMAS II can be brought together are explained step by step, as well as the procedure to be used in introducing it. The structure of the guidance is of course determined by that of the EMAS ordinance:

Available as download in English from the www.ecolup.info website



ECOLUP Experience, Benefits to the Environment

Despite the difficulties presented by determining a date all can attend, the method of holding **communal workshops** proved very effective and is to be recommended:

- the environmental aspects can be discussed from different perspectives by the environmental team members representing various disciplines, who often devise ambitious measures
- the workshops offer an excellent opportunity for the team members and the participating communities to exchange information and ideas
- the expert input helps these workshops to serve as continuing education for all participants
- in the workshop, the communities can take advantage of the positive effects engendered by groups dynamics; furthermore, the costs for the consulting services are lower.

To date, many municipalities have seldom worked with **reference figures**, if at all. The most important core data, e.g. on population density and sealed-over soil may be present, but in varying forms that can often not be compared. It is rare that a city or municipality have its own office of statistics that collects and calculates at a central location all relevant data for communal urban land use planning. Therefore, a first environmental programme from urban land use planning will have to contain a number of measures that do not serve the immediate improvement of the environmental situation, but rather are necessary for the introduction of a continual monitoring system.

Involving the town council requires a good deal of tact! It would be best if there were a member of the council on the ECOLUP environmental teams.

However, the team moderator cannot permit the discussion to be misused for the exchange of political blows. If the town council has no time to attend the workshops, it should by all means receive their protocols and be kept informed on the project's progress by the environmental management representative at regular intervals.

Nevertheless, the quality of an environmental management system and the benefits it brings to the environment depends on **political good will**, when all is said and done. EMAS and ISO 14.001 do not set environmental goals, but instead accepts those established by the organisation and assesses their realisation. The environmental programmes drawn up by the environmental teams are only drafts or recommendation that can only be made binding through their being passed by the town council. Only when environmental policy and programme are integrated into daily practice and are taken into account in the town council's decisions, can

the concrete benefits to the environment brought about through the environmental programme be estimated.

Continual improvement to environmental quality tends to manifest itself in most environmental aspects in the long term. During the ECOLUP project, it became apparent that the area of communal urban land use planning was often too limited due to the fact that the possibility of influence within these planning processes, in particular with respect to aspects such as energy or transportation, is quite limited. The field of urban development would provide more room for adjustment in respect to which goals and measures can be set. The procedure for implementing an EMS described in the guidance can be applied to all planning processes within the field of urban development.

Examples for improvement of environmental quality

Überlingen, Measures Affecting Register of Land Zoned for Building

A potential addition 2,000 people could be provided with new housing through retrospective concentration: the study showed a reserve surface area for housing of approx. 150,000 m². Assuming a city structure density with a property parcel surface area of 0.8, this level of housing usage would require a new housing settlement of approx. 20 ha. The desired more efficient use of surface area would be achieved through not zoning additional building parcels for use. This would occur to the extent that the need for additional housing could be directed onto property parcels with low structure density within the city's centre.

Constance: Measures for Increased Structure Density within the City's Centre

For a new construction project providing commercial space within the city's centre, a prize-winning project has achieved a functional mixture of housing and services with a high usage density. The usage of available space lies at a level markedly above the average found in the rest of the centre, thus raising the housing density of the city as a whole. The exact extent of this increase has not yet been calculated, but it should lie around 1%, which makes a significant contribution to savings in surface area considering how high Constance's settlement density already is.

Dornbirn, Measures Towards the Construction of New Neighbourhoods, Use of Green Areas

An additional park area was created on a former commercial site for the use of a city neighbourhood. In this way, the surrounding private housing properties have increased in value, as have the flats in the area. As a result, the demand for such properties has increased which in turn has attracted housing interest away from the city's outskirts to sites at its centre. Further related potential and the surface area that can be saved in the process have not yet been calculated.

Wolfurt, Measures for Efficient Use of New Commercial Surface Area and Use of Green Areas

An area zoned for commercial use has been defined via a land use plan as being divided into large, interconnected construction sites with shared “manipulation areas“ for access needs, parking and storage as well as interconnected green areas of the same proportions. The usual designation of 50% total structure surface area, 20% access area, 25% courtyard area, and 5% green areas has been adjusted (figures have been rounded off) to 60% total structure surface area, 20% access and courtyard area (“manipulation“), and 20% green areas. This has led to not only a more efficient usage but also to a clear decrease in sealed-off surface area.

“What does all this cost and what benefits does it bring us?“ – this is of course the question that decision-makers in politics always ask. In contrast to environmental management in firms or for administrative facilities, in the case of communal urban land use planning there is no savings to cost through the reduction of water, office material or energy use. How can we monetarise improvements to the quality of the environment in Euros and Cents? A community with environmental management in urban land use planning certainly does not receive higher prices for its construction land, nor does it become more attractive as a place for firms to set up shop.

Above all in economic hard times, it is not easy to convince a town council of the economically beneficial aspects of an environmental management system for a community’s urban land use planning. Deregulation of municipal interaction with higher levels of government administration and plus-points for applications for government funds would be of aid in increasing the applicability of EMAS /ISO 14.001 and thus the communities’ motivation to participate. In this way, the authorities responsible for EMAS /ISO 14.001 at the national and international level face the challenge of creating initiatives so that a community with an EMS validation has even greater benefits in comparison to those without.

Further information: www.ecolup.info, marion.hammerl@bodensee-stiftung.org



**Industry Led Efforts on River
and Lake Rehabilitation –
*The “Sacred” Experience in Laguna de Bay***

Tess Cayton

CONFERENCE READER



10th International Living Lakes Conference 2005

**15-19 May 2005
Tagaytay City, Philippines**

Industry-led Efforts on River and Lake Rehabilitation – The “Sacred” Experience In Laguna De Bay

Tess Cayton

Manager & PCO - Plant & Public Affairs - Bayer CropScience Inc.

President – SaCRED Foundation

Environmentally aware industries have a big potential to serve as partners in efforts to revive the tributary rivers of Laguna de Bay. Aside from resources and technical knowledge on water quality improvement, companies are also able to apply management principles in running a volunteer organization and mobilizing partners from the community and other stakeholders. It also helps if a company has a good environmental performance and a good corporate image, so it can attract people to be involved in the group's efforts and projects on river and lake rehabilitation.

SaCRED is San Cristobal River Enhancement Defenders, one of the Laguna de Bay River Councils, initially formed by LLDA in March 2000. SaCRED's vision is to be a multi-sector organization working harmoniously with communities, industries, government and other stakeholders committed to achieve the continuous improvement of San Cristobal River basin's environment quality for sustainable development.

In September 2000 the initial 30 company members elected Bayer CropScience (BCS) to lead this organization. BCS is a multinational company with headquarters in Germany - the world's leading innovative crop science company involved in crop protection, seeds and green biotechnology as well as non agricultural pest control. Environmental protection is topmost in the company's policy. A staunch supporter of sustainable agriculture, BCS practices responsible care as a tool towards sustainable development. Responsible Care: For Ourselves, For our Partners and For our Future is the company's long term commitment.

Under this continuous improvement program on health, safety and the environment, BCS has committed to work for the rehabilitation of San Cristobal River, and to participate in lake wide rehabilitation efforts for Laguna de Bay with the Federation of River Basin Councils in the area.

Other members and stakeholders from the community help achieve the objectives of SaCRED. The organization conducts monitoring of river water quality, solid waste management seminars in the community, river clean-ups, tree planting, environmental advocacy and awareness campaigns. One of its major activities is environmental values training for high school students in the area. YES (Young Environmental Stewards) program aims to develop a core of young environmentally aware stewards/leaders from the area who are endowed with the knowledge and

values needed to care of their environment, specially their rivers, and could act as agents of change. SaCRED strongly believes that the much needed improvement in our environment should be spearheaded by our YOUTH, armed with proper education and environmental values.

SaCRED works on its objectives through a lot of networking with member industries, and with government and non government organizations, schools, local government units, media, environment consultants and other stakeholders- to enhance, multiply and duplicate its efforts on river and lake protection. It is only through intensive public – private partnership led by industry, that SaCRED is able to move forward in the daunting task of rehabilitating San Cristobal River, and ultimately Laguna de Bay - “Everyone doing his small part, to ultimately create a high positive impact on lake water quality.” This is how SaCRED works.



**Water Campaign
Local Water Governance
Pam Gallares - Oppus**

CONFERENCE READER



10th International Living Lakes Conference 2005
15-19 May 2005
Tagaytay City, Philippines

Water Campaign

Local Water Governance

Pam Gallares – Oppus

Regional Director

ICLEI-Local Governments for Sustainability, Southeast Asia

c/o The Manila Observatory

Ateneo de Manila University Campus

Loyola Heights, Quezon City 1101

Manila, Philippines

Tel: +63-2/426-0851

Fax: +63-2/426-6141

Email: iclei-seasia@iclei.org

www.icleai.org

Abstract

Water as a common resource is vulnerable to conflicts. Unenlightened leadership and weak management mechanisms to enact on responsive local water legislations, to make informed decisions and to steer integrated actions would lead to further conflicts. If left unchecked, fragmented responses to conflicts and/or interests would render the local government and its constituents more vulnerable to socioeconomic and environmental risks and disasters.

The framework for local water governance does not assert that water resources within a Local Government Unit's (LGU's) political jurisdiction are solely "owned" and/or "controlled" by the local government. The crux of advocacy through local capacity-building is stewardship over water--water as a finite resource, a common good, and a basic human need-- where the LGU shares accountability and responsibility with other sectors and local governments.

"Local authorities play an important role in overseeing the implementation of IWRM activities both within their boundaries and within the local and regional watersheds. They act both as regulators and as service providers and have a role in financing. Despite varying levels of jurisdiction over water services, local governments have both direct and indirect responsibility for the water security of their communities." (Source: Toolbox on Integrated Water Resources Management, Global Water Partnership, Version 2—2003).

ICLEI-Local Governments for Sustainability is a global association of local governments. It is devoted to enabling local governments implement sustainable development actions while protecting global common goods. As a non-profit organization, one of its major functions is providing consultancy services to local governments and other partner institutions along the lines of local policy improvements and development planning, program development and management, and workshop design, organization and management. The Water Campaign, in particular, aims to protect freshwater resources through local government actions. Visit our website at www.iclei.org.

Ms. Oppus has served ICLEI for eight years now, and has had fifteen years of experience on local government development and institution-building.



Tourism Development and Environmental Land-Use Planning: The Mallorca Experience

Toni Font, Environmental Consultant and GOB Activist

CONFERENCE READER



10th International Living Lakes Conference 2005

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Tourism Development and Environmental Land-Use Planning: The Mallorca Experience

Toni Font, Environmental Consultant and GOB Activist

*C. Llimona, 32 baix esq
07008 Palma de Mallorca
Balearic Islands - Spain*

This paper tries to make a compilation of problems relating island tourism development in the Balearic Islands and easy cheap mass airborne accessibility with increased wealth bringing to the abandonment of traditional uses of the land. The fate of land is to be built and sold to newcomers looking for sun and good weather. As a case study it describes the continued degradation of wetlands in the name of greed of a minority. A very different case of what happens in poor areas in the third world, where mismanagement of these areas come from ignorance of the values at stake or lack of resources to conserve them, a process powered by humans in the search of fulfilling basic needs.

Different tools have been used to conserve the natural heritage along the last 30 years. The association of one of these wetlands to Living Lakes has been the ultimate action, and will surely not be the last.

The Rich Also Cry

“A sustainable society is one that satisfies its needs without diminishing the prospects of future generations” If we accept as valid the definition of Sustainability enshrined in this phrase by Lester Brown, from the Worldwatch Institute, we must recognize that little sustainability is around the economic model developed in the Balearic Islands.

These lines are a resume of the document filed in the web <http://www.gobmallorca.com/livinglakes/salobrar.doc>, which contains a more reasoned background and comprehensive notes and links to related information. I hope to be able to create enough curiosity in all of you along these lines to see you rushing to the page and look for more.

Even if a participation process was done in the Balearics with the aims of setting the basis of a sustainable society and a process to define and evaluate a set of sustainability indicators has been done, including programs oriented to achieve the goal of sustainability, everywhere you look in the Balearic scenario you see clues that the direction the islands are moving is the opposite to sustainable future.

The Balearics, seen from the perspective of global investment, are a 'land of opportunities', with insufficient mechanisms in place to resolve the big unbalance between a limited territory and the demand of use of resources, mainly land use for new urban developments.

Recent developments in the regional scenario (Spain incorporation to the EU, the adoption of the Euro, the low interest rates for mortgages) added to old and well known problems (such as delictive money laundering) have increased greatly the demand for real estate, with a preference by the international speculative investment to target small and preferably limited markets. No correction mechanisms have been set up to deal with the problems created by this trend.

The topic of the Balearics being a 'Touristic Economy' is still grabbed in the minds of the majority of local and overseas citizens, business people and politicians, who have not yet realized that in the last years the biggest driver, by its single contribution to the growing of the gross internal product has been the construction of new houses instead of the tourism.

Allowing the free development of this big sector creates enormous wealth, but also troubles. Insufficiently regulated real state development in this specific conjunctural economic situation poses a series of cultural, social and environmental problems and challenges to the local society in terms of:

- direct destruction of landscape, way of life and natural heritage
- indirect destruction, due to accessory infrastructures for increased population (bigger roads, airport, power plants, sewage plants, hospitals,...)
- Increased production of Municipal Solid Waste and consumption of electricity. Need for new facilities and processing plants.
- water shortage to be solved increasing the dependence on fossil fuels (new desalination plants needed)
- as a result of these pressures on the environment, grave endangering of the touristic industry
- rise of housing prices feeds fears of a bubble and makes young people unable to afford the buying of a house
- immigrants needed to cover low-qualification jobs have huge problems to afford housing, and use to pile-up in infra-houses.
- construction cannot grow forever in a limited land.

The reorientation of the construction activity, with a reconversion plan for the involved human and capital resources is a need already flagged by the sector but not addressed by the political power.

A process to implement an economic tool -an ecotax- to provide a fund to fine-tune and compensate the impacts of the Touristic activity was setup by the local government in 1999-2003. The touristic sector was severely fighting against it and the ecotax was in the centre of the political battle that ended in the change of

government in the 2003 elections, with a new right wing government withdrawing the ecotax.

GOB As A Social Actor Raising Awareness

GOB (Balearic Group of Ornithology and Defence of Nature) is a non governmental organisation and registered charity, legally founded in 1973. Details about objectives, structure, membership, funding, independence and others can be found in the website www.gobmallorca.com. Among natural areas, wetlands all around the Balearics have been widely destroyed or seriously damaged; only a few of them have a real protection and appropriately dimensioned management, and their declaration as protected areas has been the result of long term campaigns, demonstrations and legal initiatives driven mainly by GOB and widely supported by the local population.

Es Salobrar Joining Living Lakes

GOB campaign work for the conservation of the Salobrar-Es trenc area started 30 years ago. It constitutes a good example of the process that happened in other places in our Islands, that can be described as follows: For-profit groups pressing to create or take advantage from legal loopholes is followed by citizen's groups opposition and demonstration until new legal framework is established, often laying new loopholes forcing the environmentalists to be forever alert.

In this context of growing environmental problems and the recent political changes with the withdrawal of the eco-tax, the partnership of GOB and GNF (Global Nature Fund) wants to motivate especially German tourists and residents to support nature conservation work in Majorca as well as at international level, and also wants to build pressure into the local government and the Campos municipality to preserve the area.

Majorca is one of the most important destinations for german tourists and is getting more and more important for summer and third age german residents. German tour operators play an important economic role on the island and also influence politics.

Es Salobrar de Campos was officially declared an Associated Member of the Living Lakes network on the occasion of a press conference on Majorca on the UN water day 22nd March 2004. It is one more, and very useful, of the actions done by GOB to overcome threats to that natural area.

The Way Forward

From GOB perspective, the analysis of the position of the different actors shows that a long way is to be run, and that Touristic businesspeople, Construction and investment managers, Politicians, environmentalists, Labour Unions and other

Social Movements need to go through a formal process to agree a model of contention of the development that allows the survival of the natural values of our archipelago.



Strengthening Participation and Forging Partnerships for Taal Lake Conservation and Management

Ricky Nuñez, Jr.

CONFERENCE READER



10th International Living Lakes Conference 2005

**15-19 May 2005
Tagaytay City, Philippines**

Strengthening Participation and Forging Partnerships for Taal Lake Conservation and Management

Ricky Nuñez, Jr.

Board Member

Pusod, Inc.

201 Mediatrix Rd., Miracle Heights Subd.,

Antipolo Del Norte, Lipa City, Batangas 4217

Tel Nos. (63)(43) 757-3192

(63)(43) 757-3996

www.pusod.org

Summary

Taal Lake is the Philippines deepest lake and home to some of the world's unique wildlife. Taal Lake stakeholders include around 4,000 small scale fisherfolk engaged in catch fisheries, laborers in fish cages, resort and tour operators on the banks and to the famous Volcano Island and the local governments of the 9 towns and two cities which derive income from taxes, business permits and fishing vessel licenses. Right to access resources is open to all artisanal fisherfolk but recent proliferation of fish cages has severely limited such access.

Due to the proliferation of destructive fishing methods in the 70s that resulted in the rapid decline of the lake's aquatic resources, small fisherfolks in Taal Lake have organized themselves to stop the said onslaught and protect the livelihood of the small fisherfolks and of Taal Lake and its ecosystems. Thus, Kilusan ng mga Maliliit na Mangingisda sa Lawa ng Taal (Association of Small Fisherfolks in Taal Lake) or KMMLT was born in 1985.

For more than 19 years, KMMLT has lobbied countless fishery and aquatic laws and ordinances and pushed enforcement agencies and government units to act. With the passage of the National Integrated Protected Areas System (Republic Act 8550) and the subsequent establishment of the Taal Volcano Protected Landscape, KMMLT leaders saw the need to strengthen their capacities and expand membership to include small fishworkers and barangay leaders.

For decades, major threats to the lake has persisted and these threats need to be addressed through an official, powerful and representative management structure which adheres to a clear and widely understood and supported management plan to ensure the sustainability of Taal Lake and its ecosystems.



Protecting Lakes from Urban Water Pollution with Sewerage Systems

Shinji Ide, Prof. and Director of Kosho Net

CONFERENCE READER



10th International Living Lakes Conference 2005

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Protecting Lakes from Urban Water Pollution with Sewerage Systems

Shinji Ide, Prof. and Director of Kosho Net

Kosho Net, the University of Shiga Prefecture

2500 Hassaka-cho

Hikone-City

Shiga 522-8533

JAPAN

This presentation will briefly review the cases of twenty-eight lakes shown in Table 1 with a special focus on sewerage systems in the basins. Available information on these lakes shows that the current status of sewage system in individual lake basin is quite different from one lake to another.

Affordability of Sewerage Systems

First, the extent of sewage treatment at the twenty-eight lakes was analyzed based on per capita gross national income (GNI) of basin countries and population density in the basin. As a result, the following was revealed.

For lake basins with low population density and low GNI per capita, almost no sewage treatment is carried out. As both income and density increase, conventional treatment systems expand, usually with bilateral funding. For high GNI per capita countries, even in sparsely populated areas conventional and advanced treatment are carried out, usually with central or local government funding.

Sewerage system is affordable only if its “capital plus operation and maintenance cost” per capita per year and “capital cost per capita” are less than approximately 2% and 20% of GNI per capita, respectively. The capital cost of “Sewer + Treatment” would be far greater than affordable level and only treatment plants without sewer lines may be reasonable for countries in Low-Income Economies. Some affluent cities in Low-Income Economies could afford “Capital Plus Operation and Maintenance Cost” in annual basis, but it is unrealistic for even those cities to manage to raise funds for the construction of sewerage system unless bilateral or multilateral financial assistances are available.

Likewise, some countries in Middle-Income Economies may be able to bear “Capital Plus Operation and Maintenance Cost” in annual basis; however, they may not be able to incur the capital costs. Again some financial supports from developed countries or donor agencies are essential for those nations to develop sewerage systems.

Principles for Sewage System Development

The general objectives of wastewater treatment are to achieve 1) sanitation and 2) pollution control. Unfortunately, persons who bear costs for achieving those objectives may not be the same ones who benefit from the achievement. For example, wastewater treatment improves public health issues in the service area, but people downstream may not reap the direct benefits of the treatment. Improvement of water quality and pollution control of water bodies, from which drinking water is being taken, would be the primary concern for downstream people, but people upstream may not share the same concern. Wastewater treatment could engender a new conflict between upstream and downstream. However, lake basins are fortunate in this regard. The achievement of sanitation in the watershed results in the pollution control of lake simultaneously. People live in a lake basin share the common destiny. In this sense, consensus building of lake-people for wastewater treatment, apart from cost issues, can be much easier than the other areas.

Advanced Treatment for Eutrophication Control

Conventional treatment for removing carbonaceous matters may not be adequate for lake management as primary production in lakes and reservoirs cannot be negligible. Advanced or tertiary treatment for removing nutrients such as nitrogen and phosphorus is of necessity for eutrophication control of lakes. However, tertiary treatment is in general more costly than conventional one. Additional 30-50 US\$/capita/year would be required for nutrient removal. Tertiary treatment cannot be reasonable for those countries that cannot even afford conventional one.

Nevertheless nutrient removal is highly recommendable in the long run for lake management. New financial mechanisms should be explored particularly for advanced treatment. Possibilities of bilateral and multilateral financial assistances and engagement of private sectors should be inquired for the eutrophication control of lakes. User fee could be one way to get private sector involved.

Moreover, the use of less expensive treatment technologies for nutrient removal should be first considered particularly for lakes and reservoirs. Some constructed natural systems such as ponds, lagoons and artificial wetlands are capable of removing 70-90% of nitrogen, and 0-80% of phosphorus from raw wastewater. Soil-based land treatment system is also very effective for phosphorus removal.

Timing of Water Supply, Conventional and Advanced Wastewater Treatment Development

The case of Lake Constance, Lake Biwa and Lake Nakuru provide contrasting examples of the timing and methods of how water supply, conventional wastewater treatment and advanced wastewater treatment are developed.

Water supply, sewage, and advanced treatment systems were adopted step by step at Lake Constance as well as other lakes in most developed countries. However, both sewage and advanced treatment systems were introduced simultaneously at Lake Biwa after the completion of water supply system. Lake

Nakuru achieved the development of water supply and sewage system almost at the same time. These facts imply that, if financial arrangements are available, there is a possibility to develop those three systems simultaneously although stepwise implementation of environmental infrastructures is more realistic and common. The development of environmental infrastructures in a multisectoral manner would be more desirable to achieve long term goals for lake management.

This presentation will briefly review the cases of twenty-eight lakes shown in Table 1 with a special focus on environmental infrastructure such as sewerage system in the basins. Although some lakes came short of relevant data, available information on these lakes shows that the current status of sewage system in individual lake basin is quite different from one lake to another. Some lakes are completely lacking wastewater treatment in the catchment areas while others are fully equipped even with tertiary treatment.

Affordability of Sewerage Systems

First, the extent of sewage treatment at the twenty-eight lakes was analysed based on per capita gross national income (GNI¹) of basin countries and population density in the basin. The results are summarized in Table 1. The extent and degree of wastewater treatment is indicated by the **bold** letters in each cell (e.g., **Rare or Low**). The classes of treatment are represented as **low** = primary, **medium** = secondary, and **high** = tertiary. For lake basins with low population density and low GNI per capita (cell I-1), almost no sewage treatment is carried out. As both income and density increase (I-2, II-1, II-2), conventional treatment systems expand, usually with bilateral funding. For high GNI per capita countries (III-1, III-2), even in sparsely populated areas (III-1) conventional and advanced treatment are carried out, usually with central or local government funding.

Table 1: Extent of Sewerage Treatment at 28 Lakes

Population Density GNI per capita	1) < 100 person/km ²	2) >= 100 person/km ²
	I) Low-Income Economies < 736 US\$	I-1) Malawi, George, Tonle Sap, Issyk-Kul, Chad, Kariba, Tanganyika, Baringo, Chilika Rare or Low ; Even not in plan
II) Middle-Income Economies 736 - 9,075 US\$	II-1) Aral Sea, Baikal, Titicaca, Ohrid, Xingkai/Khanka, Tucerui, Peipsi/Chudskoe, Cocibolca-Nicaragua Low to Medium Partly funded by bilateral assistance	II-2) Dianchi, Laguna de Bay, Low to High Funded by bilateral or the central government's assistance
III) High-Income Economies > 9,075 US\$	III-1) Champlain, Great Lakes High + CSOs ¹ , SSOs ² and USR ³ issues. Funded by the central and local governments	III-2) Constance, Biwa High Funded by the central and local governments

Notes: ¹ CSOs: combined sewer overflows. ² SSOs: sanitary sewer overflows. ³ USR: urban stormwater runoff.

¹ GNI per capita 2002, Atlas Method (in US\$) after World Bank Statistics at <http://www.worldbank.org/data/databytopic/GNIPC.pdf>

Table 2 is cited from a draft municipal wastewater guidance document prepared by the United Nations Environment Programme, which shows ranges of costs for conventional wastewater treatment options. No information is available on how countries are divided into three economical classes in the table. If we could, however, assume that economical classifications in Table 2 were similar to the ones in Table 1, the following interesting relationship could be deduced from the two tables by comparison: Sewerage system is affordable only if its “capital plus operation and maintenance cost” per capita per year and “capital cost per capita” are less than approximately 2% and 20% of GNI per capita, respectively.

In other words, the capital cost of “Sewer + Treatment” would be far greater than affordable level and only treatment plants without sewer lines may be reasonable for Low-Income Economies with GNI per capita being less than 736 US\$. Some affluent cities in Low-Income Economies could afford “Capital Plus Operation and Maintenance Cost” in annual basis, but it is unrealistic for even those cities to manage to raise funds for the construction of sewerage system unless bilateral or multilateral financial assistances are available.

Likewise, some countries in “Middle-Income Economies”, which GNI per capita is in between 736 and 9075 US\$, may be able to bear “Capital Plus Operation and Maintenance Cost” in annual basis; however, they may not be able to incur the capital costs. Again some financial supports from developed countries or donor agencies are essential for those nations to develop sewage systems.

Table 2: Cost Ranges for On-site and Sewered (Conventional Treatment) Options

Economy	Option	Capital Cost ¹ (\$/capita)	Capital Plus Operation and Maintenance Cost (\$/capita/year)
Low-Income Economies	Treatment plant ²	20-80	5-15
	Sewer + treatment ²	200-400	10-40 ³
Middle-Income and Transitional Economies	Treatment plant ²	30-50 ²	Not provided
	Sewer + treatment ²	300-500 ²	30-60 ³
Industrialized Countries	Treatment plant ²	150-300 ¹	Not provided
	Sewer + treatment ²	100-200 ²	100-150 ³

Notes:

¹ For primary plus secondary treatment, including land purchase and simple sludge treatment, for a capacity of 30,000 to 40,000 persons. Lower values pertain to low-cost options such as waste stabilization ponds; higher values pertain to mechanized treatment such as oxidation ditches and activated sludge plants.

² For plant capacity of 100,000 to 250,000 persons.

³ For industrialized countries, this includes tertiary treatment and full sludge treatment; for other countries, this includes secondary treatment.

Source: UNEP, 2001. “Guidance on Municipal Wastewater: Practical Guidance for Implementing the Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (GPA) on Sewage.” Working Document Version 2.0, 21 October 2001. The Hague: UNEP/GPA Coordination Office.

Principles for sewage system development

Principles in Box 1 and 2 are very informative in general for the installation of wastewater treatment, even though which are not exclusively for lakes and reservoirs. The Boxes summarize the key principles and experiences of the

UNEP's wastewater guidance document mentioned previously and the World Bank, respectively. Many of the twenty-eight lakes are facing problems with wastewater treatment. Those problems are caused by neglecting one or some of principles in Box 1 and 2.

Box 1: Key Principles for Municipal Wastewater Management

1. Political will and financial affordability are prerequisites for adequate wastewater management.
2. Environment, health, and economy are important indicators for action.
3. Stepwise implementation of measures is essential to reach long-term management goals.
4. Demand-driven analyses and prognoses ensure effective investments.
5. National and local governments are responsible for creating an enabling environment for sustainable solutions.
6. Commitment and involvement of all stakeholders are assured from the start.
7. "Water User Pays" and "Polluter Pays" are basic principles to consider.
8. Public-private partnerships and other new financial mechanisms should be explored.
9. Linking municipal wastewater management systems to other sectors, for example water supply or tourism, ensures better opportunities for adequate cost recovery.
10. Sustainable solutions for wastewater management build upon pollution prevention at the source, efficient water use and best available technologies, and address economic aspects and low-cost alternatives when appropriate.
11. Innovative alternatives and integrated solutions are to be fully explored before final decisions on action are taken.

Source: UNEP, 2001. "Guidance on Municipal Wastewater: Practical Guidance for Implementing the Global Programme of Action for the Protection of the Marine Environment from Land-Based Activities (GPA) on Sewage." Working Document Version 2.0, 21 October 2001. The Hague: UNEP/GPA Coordination Office.

The general objectives of wastewater treatment are to achieve 1) sanitation and 2) pollution control. Unfortunately, persons who bear costs for achieving those objectives may not be the same ones who benefit from the achievement. For example, wastewater treatment improves public health issues in the service area, but people downstream may not reap the direct benefits of the treatment. Improvement of water quality and pollution control of water bodies, from which drinking water is being taken, would be the primary concern for downstream people, but people upstream may not share the same concern. Wastewater treatment could engender a new conflict between upstream and downstream. However, lake basins are fortunate in this regard. The achievement of sanitation in the watershed results in the pollution control of lake simultaneously. People live in a lake basin share the common destiny. In this sense, consensus building of lake-people for wastewater treatment, apart from cost issues, can be much easier than the other areas.

Box 2: Key Lessons from the World Bank Experience with Wastewater Treatment Plants

1. Assessing environmental issues from the beginning.
2. Using regional and multisectoral planning.
3. Creating extensive stakeholder involvement.
4. Using a demand-oriented approach.
5. Engaging the private sector.
6. Providing sufficient funds for operation and maintenance (O&M).

Source: the World Bank, 2003. "Water Resources and Environment Technical Note D.2—Water Quality: Wastewater Treatment—"

Advanced treatment for eutrophication control

On the other hand, conventional treatment for removing carbonaceous matters may not be adequate for lake management as primary production in lakes and reservoirs cannot be negligible. Advanced or tertiary treatment for removing nutrients such as nitrogen and phosphorus is of necessity for eutrophication control of lakes. However, tertiary treatment is in general more costly than conventional one. Additional 30-50 US\$/capita/year would be required for nutrient removal (see Table 3). Tertiary treatment cannot be reasonable for those countries that cannot even afford conventional one.

Wastewater may not be the sole and primary source of nutrients to lakes. The primary source can be air-born ones for some lakes. In this case, nutrient removal from wastewater may not be the most cost-effective way to achieve eutrophication control. Precise assessment of environmental issues is indispensable prior to decision-making concerning tertiary treatment. However, some kind of treatment such as basic or primary one is a prerequisite in any case for riparian big cities, even though it may not be sufficient for lake conservation. Stepwise implementation of measures is essential in general to achieve long-term lake management.

Table 3: Generally Applied Wastewater Treatment Methods

Method	Pollution Problem	Efficiency	Costs (US\$/capita/year) ⁴
Chemical precipitation	Phosphorus removal	0.65-0.95	7-13
Nitrification	Ammonia -> nitrate	0.80-0.95	15-22
Denitrification	Nitrogen removal	0.70-0.90	11-18
Waste stabilization ponds	Microorganism	High	2-6
	Reduction of BOD ₅	0.70-0.85	
Constructed wetland	Nitrogen removal	0.50-0.70	4-11
	Reduction of BOD ₅	0.20-0.50 ⁵	
	Phosphorus removal	0.70-0.90	
		0.00-0.80 ⁶	

Notes:
⁴ Originally the costs were estimated in US\$/100 m³. The author converted them into ones in US\$/capita/year with the assumption that one person discharges 0.2 m³ of wastewater per day.
⁵ Presume a pretreatment (BOD₅ <= about 75 mg/L).
⁶ The removal is dependent on the adsorption capacity of the soil applied and whether harvest of the plants is foreseen.

Source: United Nations Environment Programme—International Environmental Technology Centre, 1999. "Planning and Management of Lakes and Reservoirs: An Integrated Approach to Eutrophication."

Nevertheless nutrient removal is highly recommendable in the long run for lake management. New financial mechanisms should be explored particularly for advanced treatment. Possibilities of bilateral and multilateral financial assistances and engagement of private sectors should be inquired for the eutrophication control of lakes. User fee could be one way to get private sector involved.

Moreover, the use of less expensive treatment technologies for nutrient removal should be first considered particularly for lakes and reservoirs. Some constructed natural systems such as ponds, lagoons and artificial wetlands are capable of removing 70-90% of nitrogen, and 0-80% of phosphorus (seen Table 3) from raw

wastewater. Soil-based land treatment system is also very effective for phosphorus removal.

Timing of Water Supply, Conventional and Advanced Wastewater Treatment Development

Another key question over environmental infrastructures for lakes and reservoirs is the timing and methods of system development, more specifically, how water supply, conventional wastewater treatment and advanced wastewater treatment should be developed.

If we look into the cases of Lake Constance, Lake Biwa, and Lake Nakuru for the development history of environmental infrastructures, quite different characteristics in terms of development time frame can be observed in these three lakes.

As for Lake Constance, people in the catchment area have been provided with water supply service more than one hundred years. Installation of sewerage system came very late after the completion of water supply system. In 1972 only 25% of all inhabitants in the catchment area were connected to sewage plants with biological treatment. However, the percentage had increased rapidly since then to reach 90% in 1985 and over 95% in 2001. At the same time the percentage of sewage treated with phosphorus removal systems in the entire wastewater treatment increased from 24% in 1972 to 88% in 1985, and is 97% in 2001.

The population coverage of water supply at Lake Biwa basin was only 30% or so even in the 1950s, but in step with high economic growth in Japan, the percentage increased rapidly and reached 80% in the 1960s. However, one of sewage system still remained at a low percentage, and only 4% until the 1980s. Drastic improvement of sewage system in Shiga has started at last from the early 1980s, and it reached 70% today. In addition, partly because the installation of sewage system started very late, advanced treatment for eutrophication control has been implemented from the beginning with the sewage system development. Today, the percentage of advanced treatment in Shiga is the highest in Japan.

In sharp contrast to the above two lakes, full scale water supply system was first installed in the catchment area of Lake Nakuru in the early 1990s. However, as a result, old sewage treatment plant became unable to treat newly generated wastewater from this water supply, and much of wastewater began to come into the lake without treatment. To solve this problem, a large scale improvement project of sewage system started at Lake Nakuru several years later. However, no advanced treatment has been installed yet. This illustrates the necessity of multisectoral plan that we should consider the development of water supply system together with sewage system.

In short, water supply, sewage, and advanced treatment systems were adopted step by step at Lake Constance as well as other lakes in most developed countries. However, both sewage and advanced treatment systems were introduced simultaneously at Lake Biwa after the completion of water supply

system. Even though Lake Nakuru had the above mentioned problem and do not have advanced treatment yet, it achieved the development of water supply and sewage system almost at the same time. These facts imply that, if financial arrangements are available, there is a possibility to develop those three systems simultaneously although stepwise implementation of environmental infrastructures is more realistic and common. The development of environmental infrastructures in a multisectoral manner would be more desirable to achieve long term goals for lake management.



NATURAL BIOLOGICAL TREATMENT SYSTEMS: ARTIFICIALLY FLOATING MACROPHYTE FILTERS

Eduardo De Miguel

CONFERENCE READER



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NATURAL BIOLOGICAL TREATMENT SYSTEMS: ARTIFICIALLY FLOATING MACROPHYTE FILTERS

EDUARDO DE MIGUEL. DIRECTOR F.G.NATURE

Fundación Global Nature

c/ Capitán Haya, 23 esc.2 9º-2

28020 Madrid

Spain

Tel: +34915569390 / +34679171426

Fax: +34915569895

E-Mail: edemiguel@fundacionglobalnature.org

www.fundacionglobalnature.org

Artificially floating macrophyte filters are a new waste water treatment system based on emergent aquatic plants that naturally root to the soil, but in this case are converted into artificially floating macrophytes. Since they float, these species form a dense mat of roots and rhizomes that occupy the entire volume of the pond or canal, thus forcing all the water to circulate through the matted vegetation. This new method combines the advantages of floating and emergent macrophyte systems, eliminating or reducing the drawbacks of these systems. At present, these filters are being used experimentally in Spain at four airports and to improve the quality of the water in a protected wetland area. Fundación Global Nature is now managing a LIFE-Environment project financed by the European Commission in the municipality of Lorca (Spain) to demonstrate the effectiveness of a wastewater treatment system using 7 artificially floating macrophyte filters (FMF).

The construction and operating costs of conventional water treatment systems often are cost-prohibitive. They involve highly mechanized systems and require a minimum inflow that exceeds the water treatment needs and economic possibilities of small population centers. Natural low-rate biological treatment systems tend to be lower in cost and less sophisticated in maintenance although they require the use of relatively large land areas.

The three main natural treatment systems are:

- Upland natural wastewater treatment systems
- Wastewater stabilization ponds
- Wetland wastewater treatment systems (Macrophyte treatment)

Macrophyte treatment:

They are ponds which incorporate aquatic plant species. Macrophytes take up large amounts of inorganic nutrients (especially N and P) and heavy metals as a consequence of the growth requirements. The harvested plants might be fed to cattle, used as a green manure, composted or converted into biogas.

Floating Aquatic Macrophyte Systems

Several genera are used, including *Salvinia*, *Spirodella*, *Lemna* and *Eichornia* (water hyacinth). In tropical regions, water hyacinth can produce more than 250 kg/ha d (dry weight). Floating macrophyte species can be easily collected. In colder regions, these floating species do not reach a large size, and their production of biomass is limited, which reduces their absolute water treatment value.

Emergent Macrophyte Treatment Systems

The growth rate and pollutant assimilative capacity of emergent macrophytes such as *Phragmites communis* and *Scirpus lacustris* are limited by the culture system and wastewater loading rate. More than 50 % of the nutrients are stored in below-ground portions of the plants, difficult to harvest to achieve effective nutrient removal. However, because emergent macrophytes have more supportive tissue than floating macrophytes, they might have greater potential for storing the nutrients over a longer period. Consequently, frequent harvesting might not be so necessary to achieve maximum nutrient removal.

1. System of emergent superficial-flow macrophytes:

In superficial-flow systems, contaminants are eliminated through reactions that take place in water and upper zone of contact. Little wastewater circulates through the roots, which limits their water treatment capacity.

2. System of emergent subsuperficial-flow macrophytes:

As in the previous system, a layer of gravel or soil is used, through which water circulates by gravity. Its most important drawback is the rapid clogging up of the terrain with time by roots, rhizomes, and sedimented solids.

3. A new method: artificially floating macrophyte filters

This wastewater treatment system, developed by the School of Agricultural Engineering of Madrid, is based on emergent macrophytes that naturally root to the soil, but in this case are converted into artificially floating macrophytes. Since they float, these species form a dense mat of roots and rhizomes that occupy the entire volume of the collector (pond or canal), thus forcing all the water to circulate through the matted vegetation, which supports microorganisms that degrade organic material.

This new method combines the advantages of floating and emergent macrophyte systems, eliminating or reducing the drawbacks of these systems. To date, *Typha*, *Phragmites*, *Sparganium*, *Scirpus* and *Iris* have been used especially.

The advantages of the FMF system are:

- Easy installation and minimum energy demand
- Greater effectiveness: the entire volume of wastewater circulates through the treatment mesh (annual absorption rate 180 g N/ m² and 27 g P/ m²) (*Typha latifolia*)
- Harvesting does not destroy the system
- Production of a large amount of biomass. 13 kg/m² year of dry matter (*Typha latifolia*)
- It absorbs hydraulic peaks because the filter volume acts as a laminator
- Little noise and low visual impact

At present, a Floating Macrophyte Filter is being used experimentally in Spain at Madrid, Reus, Fuerteventura and Alicante airports. The first one for 500 inhabitant-equivalents. Another project is now finished in Villacañas (Toledo). The project included the construction of a 550 m long channel for treating nutrient-laden water from a primary and secondary water treatment plant in order to improve the quality of the water in a protected wetland area.

Fundación Global Nature is now managing a LIFE-Environment project (European Commission) in Lorca (Spain), to demonstrate the effectiveness of a wastewater treatment system using floating macrophyte filters (FMF). Here, about 35.000 inhabitants, live in small, dispersed population centers or in single-family homes. Most of the dispersed population centers have sewage lines, but no water treatment stations. 1.100 pig farms also cause severe environmental problems due to the lack of adequate purine.

Seven filters are now finished: 3 in small isolated centers (150-500 inhabitants), 2 in single-family homes, one in an Interpretation Center and another one in a pig farm.



PROTECTING THE MAHAKAM LAKES IN EAST KALIMANTAN THROUGH A ECO-REGIONAL DEVELOPMENT PROGRAM FOR SUSTAINABLE LIVELIHOODS

Dr. Sumaryono

CONFERENCE READER



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PROTECTING THE MAHAKAM LAKES IN EAST KALIMANTAN THROUGH A ECO- REGIONAL DEVELOPMENT PROGRAM FOR SUSTAINABLE LIVELIHOODS

Dr. Sumaryono

*Program advisor, RASI Conservation Foundation, Jl. Pandan Harum Indah Blok D,
No. 87, Samarinda, East Kalimantan, Indonesia*

and

*Forest Landscape Researchers Group, Faculty of Forestry, Mulawarman
University, Samarinda, East Kalimantan, Indonesia*

The Middle Mahakam Lakes area is an area of high socio-economic value for the fishing industry and a water-catch and river regulatory system. Moreover, this area has a high biodiversity potential and also hosts the symbol species of East Kalimantan, the Critically Endangered Irrawaddy dolphin. Major identified threats involve sedimentation and species habitat loss through logging and forest fires, pollution by pesticides, land conversion and over-fishing through unsustainable fishing techniques. The main goal of RASI Conservation Foundation is to establish a community supported and law-enforced zonation design for critical wetlands, lakes and river habitat in the Middle Mahakam Area (MMA) with regards to extractive, restricted and prohibitive use of natural resources and bird, fish-spawning, and freshwater dolphin protected areas. The design will be developed through bio-ecological and socio-economic assessment surveys, awareness campaigns and district workshops.

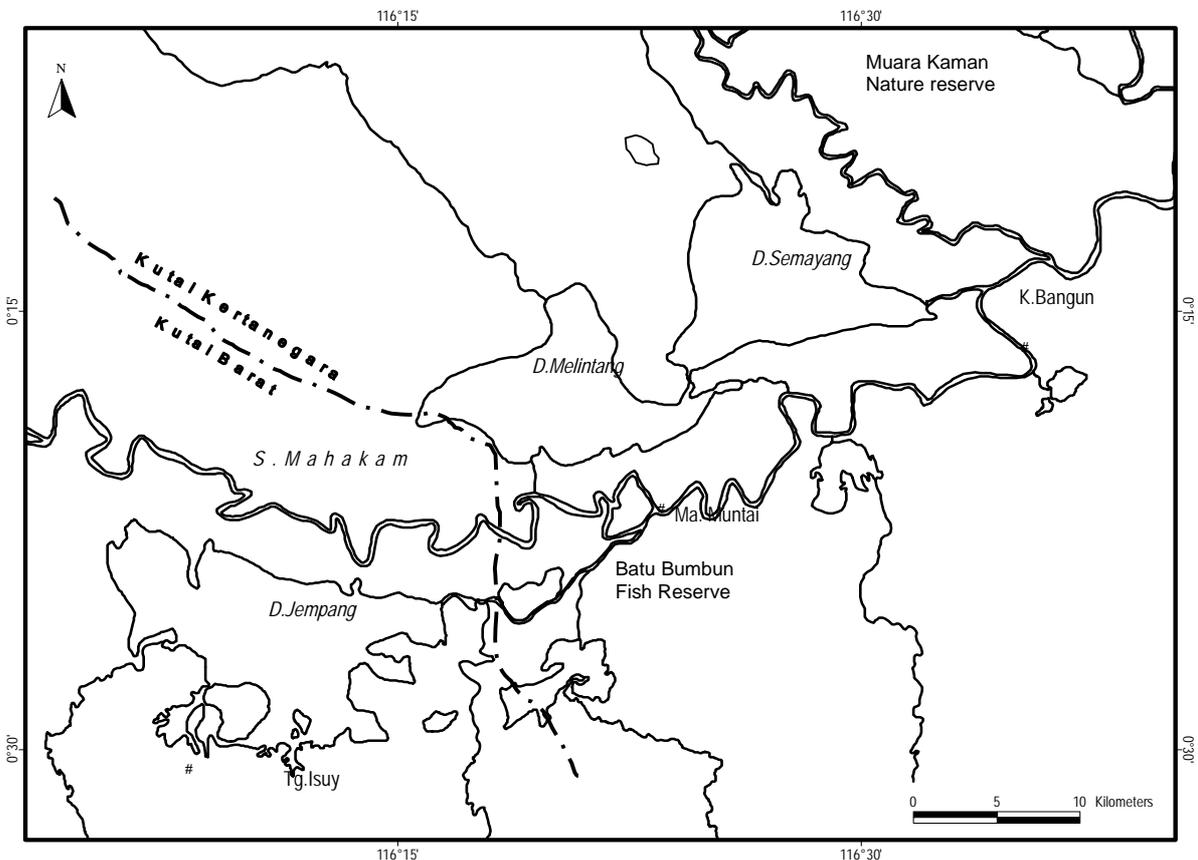
Introduction

The Middle Mahakam Lakes area is an area of high socio-economic value for the fishing industry and a water-catch and river regulatory system. Moreover, this area has a high biodiversity potential and also hosts the symbol species of East Kalimantan, the Critically Endangered Irrawaddy dolphin. Major identified threats involve sedimentation and species habitat loss through logging and forest fires, pollution by pesticides, land conversion and over-fishing through unsustainable fishing techniques. There is a need for establishment of protected areas and zonation planning with regards to extractive, restricted and prohibitive use of natural resources. Besides, there should be reforestation of burnt freshwater swamp forests in order to reduce sedimentation and recover habitat for wildlife species.

Middle Mahakam Lakes

The area of the Middle Mahakam Lakes (MML), which is situated between 116° - 117° E, and 0°00' - 0°30' S, covers about 400,000 ha. The area is located in East Kalimantan in the Sundaland ecoregion and is part of the Mahakam River, which is

one of the major river systems of Kalimantan. The three largest lakes are Danau Jempang (about 15,000 ha), Danau Melintang (11,000 ha) and Danau Semayang (13,000). Due to alternating water levels the size of the lakes's water surface ranges from zero in extremely dry years (1982/83, 1991, 1994, 1997/98) to more than 60,000 ha. Their maximum depth is about 6-7m. Annual fluctuations can reach more than 6m. The vegetation of the lakes is dominated by floating weeds (mainly *Salvinia* sp. and *Eichhornia crassipes*, *Mimosa pigra* and *Polygonum barbatum*) (Gonner, 2000). Previously vast swamp forests have been severely affected by forest fires in 1998. The swamp area of the lakes is surrounded by freshwater swamp forests, peat swamp forests and lowland dipterocarp rain forests. On a landscape level, the area has an important buffer role for the natural regulation of the Mahakam and downstream settlements.



Importance of Area Preservation

The lakes and wetlands areas in the Middle Mahakam are one of Kalimantan's most important wetlands areas. It has been identified as a crucial breeding and migration site for a total of 90 bird species, including important breeding populations of various herons and the Lesser Adjutant. Fish diversity, and the presence of endangered mammals such as Proboscis Monkeys, wild Banteng, False Gaviel and Siamese Crocodile, as well as the critically endangered

Irrawaddy dolphin indicate the importance of preservation of these areas. The preservation of these wetlands and lakes have not only a national but also international biodiversity importance in terms of migrating and breeding bird species in these areas.

The MML also has a national economic importance with an annual catch of 25.000 to 35.000 metric tons since 1970 (Christensen, 1998). At present, this area is the largest single supplier of dried freshwater fish. However, up to now no official protection status was given to the MML. Although Semayang Lake was proposed as National Park in the early 1980s by the Directorate General for Forest and Nature Conservation of the Forestry Ministry of Indonesia, until present (2005) no official protection status has been given to any open water body within the Mahakam River ecosystem. With regards to protected fish reserves, nine out of a total of 11 fish sanctuaries were identified during a survey conducted by the Indonesian Institute of Sciences (LIPI) in 2003 (pers. comm., Dr. Dede Irving Hartoto) to be destroyed as a result of sedimentation because of upstream logging. Two fishery conservation areas, the first one encountered upstream near Kota Bangun (Loa Kang), which is 930 ha in size and the second one near Muara Muntai 450 ha in size (Batu Bumbun) are still relatively intact. Both reserves have been set up during the Kutai Moslim Sultanate some 500 years ago and have been managed under Kutai Regency since 1978 (*Perda Kabupaten Kutai No. 18, 1978*).

Effects of human settlements on the lakes

A study on land use modeling and restructuring landscape of the lakes conducted in 2002 (Sumaryono, 2005) indicated that communities surrounding the lakes of Semayang and Melintang have a main livelihood as fishermen, whereas in Jempang Lake, they mainly subsist on farming. This is due to differences in landscape of the areas surrounding the lakes, which consist of freshwater swamp (forest) for Semayang and Melintang Lakes and is unsuitable for agriculture. For these last lakes measurement studies on sedimentation in the lakes, as a result of devegetation of surrounding lakes shores and upstream logging, have been conducted by Mulawarman University between 1998 and 1999 (Hardwinarto, 2000). The results show that sedimentation is largely due to erosion caused by forest exploitation upstream of Enggelam River connecting with Melintang Lake and Kahala River connecting with Semayang Lake. Forest fires to open areas for fisheries or agriculture also increase this sedimentation. Besides causing an increase in shallowness, it also causes an increase in aquatic weeds. Pollution occurs in these lakes as a result of fishing techniques, which use poison of different chemical composition, especially during the flood season when fish is more scattered. In Jempang Lake most farmers open forest areas for swiftland cultivation. Besides, opening extensive forested areas for oilpalm plantations (covering over 100,000 ha) and coal-mining causes sedimentation to be much higher in this lake compared to the other lakes. Pesticides used in these land-use activities may form a considerable threat to the lakes, but no data are available on the concentrations in the lakes. Ammonium levels, which are derived from domestic and agricultural waste products, were found to exceed the maximum

levels of the B rank for water quality at the mouths of both Jempang and especially Semayang Lake according to a study conducted between 1996 and 1999 by the Environmental Impact Controlling Body of East Kalimantan (Bapedalda I, 1999). Also, phosphor, which is derived from fertilizer and soap products and may cause eutrophication, was 3 to 4 times higher than the standard concentration of 0,5 mg/l, at which already increase of vegetation occurs, in both mouths, and highest for Jempang Lake. Faecal pollution from husbandry and villages was relatively low and entered in the B rank for water quality.

Impacts on human settlements on wildlife in the lake areas occurs through:

- Direct catch of protected and endangered species (e.g. herons, storks, hornbills, crocodiles, turtles). Most recently thousands of wandering whistling-ducks (*Dendrocygna arcuata*) have been caught between August and October 2004. Firstly, by nets but now pesticides are being used. Pond herons are also being poisoned by cyanide to catch and sell them for food in Jempang Lake;
- Habitat and species diversity loss through forest fires and (illegal) logging.
- Overfishing (cf. Christensen 1988) and unsustainable fishing techniques such as electro-fishing and using poison;
- Boat traffic (noise and fuel pollution) disturbing breeding bird populations and freshwater dolphins;
- Direct mortality of freshwater dolphins through gillnet entanglement. Present mortality rate is 5 dolphins per year on average and PVA analysis revealed that the population can only survive if 2 to 3 individuals can be saved yearly (Kreb, 2004).

Conservation Activities Proposed and Undertaken

RASI's first inventarisisation of the Middle Mahakam Area and Lakes was made between 1999 and 2002 during a Ph.D study of Kreb (2004) on the conservation of the freshwater Irrawaddy dolphin, which appeared to concentrate in the connecting confluence areas with the lakes and was also a regular visitor the lakes (Kreb & Budiono, 2005). In 2001, RASI conducted a survey on the status of several bird species and in particular lesser adjutants and crocodile species in cooperation with the Global Nature Fund (Budiono, 2001).

Present and future activities of RASI focus on habitat protection of wetlands and lakes and important river areas and are part of a larger program to protect the freshwater dolphin population. This program has started since 2000 with the help of several (inter)national sponsors and mostly focused on increasing awareness of schoolchildren and fishermen with regards to the dolphins' protection and sustainable use of natural aquatic resources.

Some specific objectives and activities have been proposed and are currently being undertaken such as:

1. Maintain biological diversity with particular reference to the freshwater Irrawaddy dolphin through protection and upgrading of its habitat and prey resources in the main river and lakes.

2. Build community commitment to a sustainable use of natural resources of the aquatic (related) environment by conducting socio-economic and biodiversity assessment surveys, and education awareness campaigns focusing on the sustainable use of natural resources and conservation status of several wildlife species, especially birds and freshwater dolphins.
3. Organize a workshop in each district (i.e. on site) in which the results of the socio-economic and bio-diversity assessment studies are presented and discuss a preliminary zonation design of area usage with a suitable panel of all stakeholders with overlapping landuse interest. Prepare a final design, which is approved by a majority of community representatives and develop local or national legislation.
4. Active promotion of this area as an (inter)national tourism site to enforce political and societal support for the preservation of this area.

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Environmental User Fee System (EUFS)

Mr. Ceasar Natividad

CONFERENCE READER



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Environmental User Fee System (EUFS)

Mr. Ceasar Natividad

Laguna Lakes Development Authority

Abstract

In order to make its environmental efforts more effective, the Laguna Lake Development Authority (LLDA), an attached agency of the Philippine Department of Environment and Natural Resources (DENR), implemented in its administrative jurisdiction a pollution charge system or Environmental User Fee System (EUFS) as a special project in early 1997. The LLDA EUFS was designed in a manner that integrates and harmonizes command and control (CAC) and economic instruments with the objective of generating mechanism to improve environmental enforcement and compliance status of firms located in the Laguna de Bay Region.

After LLDA implemented EUFS in 1997, enterprises responded by increasing their efforts to treat their wastewater by putting up new or improving their existing treatment facilities; employing wastewater recycling activities; waste minimization; and voluntary closure or plant relocation. This was greatly influenced by the LLDA's strengthened compliance monitoring and enforcement activity.

The successful implementation of the EUFS in Laguna de Bay Region and its integration in the Laguna Lake Development Authority's environmental management program served as a precedent and means for the Philippine Congress to pass and approve the Philippine Clean Water Act of 2004, to implement similar or improved system nationwide based on the lessons learned.



Pasig River Rehabilitation Master Plan

Bingle H. B. Gutierrez

CONFERENCE READER



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Pasig River Rehabilitation Master Plan

Bingle H. B. Gutierrez

Executive Director

Pasig River Rehabilitation Commission

2nd Floor, Engineering Building, MWSS Cmpd,

Katipunan Road, Balara, Quezon City

Philippines

T: (02) 433-3446

prrc@tri-isys.com

Situation

The Pasig River passes through the urban heart of Metro Manila in the Philippines and is a major waterway of national significance to the historic, social, cultural and commercial heritage of the Philippines. It links two major water bodies in the region, the Manila Bay on the west and the Laguna de Bay in the east, three major tributaries namely the San Juan River in the north, Marikina River in the northeast and Pateros-Taguig River in the southeast, and numerous creeks and canals. As a result of population growth, urbanization, and industrial activities, the indiscriminate discharge of untreated municipal and industrial wastewater and solid waste exceeds the absorptive capacity of the river system, and the Pasig River has become seriously polluted. The riverbanks are characterized by low grade, blighted urban development, including extensive squatter settlements, depressed residential areas, and large tracts of derelict industrial land. To restore the river environment and realize the full socioeconomic development potential of the Pasig River and the adjacent urban areas, it is necessary to rehabilitate the river system, restore water quality, limit and control wastewater discharges, and promote urban renewal along the riverbanks.

The Pasig River Rehabilitation Commission

The Government of the Philippines (GOP) has embarked on a number of initiatives to respond to these challenges of river rehabilitation. The Pasig River Rehabilitation Commission (PRRC) was created in 1999 through the issuance of Executive Order No. 54 as amended by Executive Order No. 65 to give institutional focus on the rehabilitation work and ensure that the waterway is rehabilitated to its historically pristine condition conducive to transport, recreation and tourism.

In line with this mandate, PRRC was vested with comprehensive powers and functions including the (1) formulation of a Master Plan on the Rehabilitation of the Pasig River; (2) establishment of river easements; (3) program integration and coordination; (4) abate the dumping of untreated industrial wastewater and

sewage into the river; (5) relocation of settlers, squatters and other unauthorized or unlawful occupants along its banks; (6) undertaking of civil works for river rehabilitation and protection such as dredging, clearing of structures, cleaning of the river and all esteros and waterways that drain into it; (7) submission of progress reports to the Office of President; (8) coordination with all government agencies and offices, including local government units; and (8) formulation and adoption of implementing rules and regulations.

The Commission is composed of 12 national government agencies, namely the Department of Budget and Management (DBM) as Chair, Metro Manila Development Authority (MMDA) as Co-Chair, Department of Environment and Natural Resources (DENR), Department of Finance (DOF), Department of the Interior and Local Government (DILG), Department of National Defense (DND), Department of Public Works and Highways (DPWH), Department of Tourism (DOT), Department of Trade and Industry (DTI), Department of Transportation and Communications (DOTC), Housing and Urban Development Coordinating Council (HUDCC), Office of the Executive Secretary (OES); four private sector representatives, namely the GMA Network, Inc., Clean and Green Foundation, Inc., Unilever Philippines and Hon. Micaela C. Jaworski; and local government units within the Pasig River basin through the Metro Manila Mayors League.

These representations act as members of the PRRC Board of Commissioners as the policy-making body. Member agencies also serve as project implementing agencies and are organized into five (5) Technical Working Committees representing the PRRC sectoral concerns. These are the (1) Housing and Resettlement Committee chaired by HUDCC; (2) Riverbank, Transportation and Tourism Development Committee chaired by MMDA; (3) Flood Control Committee chaired by DPWH/MMDA; (4) Environmental Management Committee chaired by DENR; and (5) Public Information and Advocacy Committee also chaired by MMDA.

Pasig River Rehabilitation Master Plan (PRRMP)

The PRRMP was drafted by Palafox Associates covering the 15-year period 2000-2015 with Class C water quality as the overall objective. It is a comprehensive river rehabilitation program integrating and updating the Feasibility Study prepared under the Danish International Development Assistance (DANIDA) Assistance to the Pasig River Rehabilitation Program (PPRP), the Asian Development Bank (ADB)-Assisted Pasig River Development Plan (PRDP) and the sectoral plans of the Technical Working Committees and agencies. Programs and projects completed and currently being implemented in line with the PRRMP are in two major areas, policy reform agenda and investment projects and two major sectoral concerns namely, environmental management and urban/physical development of riverbank areas.

Programs and Projects

Completed projects include the (1) Extension of the Danish Assistance to the Pasig River Rehabilitation Program in partnership primarily with DENR, LLDA, Environmental Management Bureau (EMB), LLDA and MMDA; and (2) Belgian Assisted-Dredging and Sanitation Works for the Pasig River; (3) Japan International Cooperation Agency (JICA)-Assisted Rehabilitation and Expansion of the Flood Control Operation and Warning System in Pasig-Marikina-Laguna Lake Watershed; (4) Japan Bank for International Cooperation (JBIC) Assisted-Pasig San Juan Marikina River Channel Improvement Project, Detailed Engineering Design Phase; and (5) the locally-funded Urgent Disaster Flood Control Works under the Pasig-San Juan-Marikina River System for Fiver Priority Areas in partnership with DPWH.

The Danish International Development Assistance (DANIDA) supported the two-year Extension/Transition Phase of the Danish Assistance to the Pasig River Rehabilitation Program (PPRP) until 2002. This primarily involved the institutionalization of the Data Base on Industrial Pollution from Points Sources (DIPPS) and the Mike 11 River Model, capability-building and project support to PRRC and member agencies including non-government organizations such as the Sagip Pasig Movement (Clean River Zone Projects) and Clean and Green Foundation Inc. (Public Information and Advocacy Projects) and local government units through the MMDA (Community-based Solid Waste Management Projects for Riverside Communities). PRRC supported DPWH in the implementation of pilot flood control and navigation-improvement related dredging and warning projects and priority river protection/revetment projects

Major ongoing programs and projects in various stages of implementation and project preparation include the (1) ADB-Assisted Pasig River Environmental Management and Rehabilitation Sector Development Program (PAREMAR); (2) Pasig River Ferry Service Project; (3) Pasig River Biodiversity Research Project; and (4) Pilot Constructed Wetlands Projects which will explore the possible application of the phytotechnology and integrated vertical constructed wetland technology for wastewater treatment.

The ongoing ADB-Assisted PAREMAR includes a package of urgent policy reform agenda and investment component. The policy reform agenda includes (1) the approval, adoption and implementation of the PRDP; (2) provision of sanitation services in addition to the targets set in the Metropolitan Manila Waterworks and Sewerage System (MWSS) concession agreements; (3) establishment for Metro Manila a wastewater discharge permit system with a progressive tariff structure; (4) improvement of domestic solid waste management for riverside barangays; (5) establishment of environmental preservation areas (EPAs) along the riverbanks and undertaking urban renewal in adjacent areas; (6) review, strengthening, and unifying of environmental regulations and discharge standards; (7) strengthening of water quality monitoring and enforcement capability and capacity; (8) enhancing public

awareness of environmental issues; and (9) strengthening of the institutional capacity of agencies concerned with environmental management.

The investment component includes projects on (1) urban renewal area (URA) up to 500 meters of riverbank areas; (2) establishment of a minimum of 10-meter environmental preservation areas (EPAs) along the riverbanks; (3) relocation, housing and resettlement; and (3) sanitation services which include the procurement of 36 vacuum trucks for septic tank maintenance and the construction of a 600 cubic meter per day capacity septage treatment plant for approximately 185,000 households within areas in the Pasig River Basin with zero sanitation services coverage under the MWSS concession agreement.



Laguna de Bay as a Water Source Mr. Francisco A. Arellano

CONFERENCE READER



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Laguna de Bay as a Water Source

Mr. Francisco A. Arellano

Maynilad Water Services

(63) (02) 928-1454

In the early 60's, the Philippine government has envisioned the potential use of Laguna Lake as the drinking water source for Metro Manila in the year 2000 and onwards. At the time the lake water was suffering from eutrophication and the natural hydraulic of the lake results in the regular influx of sea water in the lake through Pasig River. To prepare for this project, the government has encouraged the propagation of fishery in the lake, constructed a hydraulic control structure to prevent the ingress of sea water and prepared a phase implementation plan for the construction of an interceptor system to collect sewage or domestic wastewater along the drainage basin of the lake. This resulted in the proliferation of fishpens in the lake. The hydraulic structure was completed but has not been used to date because of the objection of fishermen who believe that salinity and nutrients are needed by the fishing industry. The interception sewer system has not been implemented.

The proposal to use Laguna Lake as a drinking water source has taken several dimensions. The Metropolitan Waterworks and Sewerage System (MWSS), the agency chartered to provide water for Metro Manila has undertaken several studies to prepare for this project. The latest scheme for water supply source is the government's plan to accept proposal to put up a water treatment facility in Putatan, Muntinlupa for a 400 MLD water supply on a BOT Scheme (Build Operate and Transfer). The terms of reference or TOR of the project does not specify the source of water and the basic consideration for proposal evaluation is the cost of the delivered water. Because of the strong opposition of the fishermen and fishpen operators, the government decreed in 1985 the opening of the control gates of the hydraulic structures. As such, any prospective users of the lake water has to contend with the saline content of the water and factor the same in the cost of water. Any proponent who decides to use Laguna Lake as a source of water have to require government guarantees for the quality of the lake water and in the operations of the hydraulic structures. The minimum chloride requirement for an economically feasible treatment operation is 600 ppm. This paper looks back into the potential of the lake as a source of drinking water considering its current multi-use features and the varying requirements for water quality and quantity.

Laguna Lake is the largest lake in the Philippines and one of the largest in South East Asia. Its current beneficial uses are: fisheries, irrigation, hydro-electric power generation, industrial cooling, transportation, recreation, domestic water supply and

flooding reservoir. It also serves as the water sink for its tributary drainage. The project on the use of the lake water for drinking water has to address the following concerns should the government intends to pursue these endeavors:

- a.) resolution of the conflict on priority use
- b.) possible socio-economic impacts of the project on
 - a. fisheries
 - b. agriculture
 - c. flooding
 - d. stringent pollution control measures
- c.) social acceptability of the project
- d.) environmental issues of the project; geotechnical and water quality
- e.) cost for treating the water

The resolution of the above issues and concerns will be dependent on several factors and will be entirely based on the envisaged scheme of the proponent technical designs of the project, abstract point, and operations of the hydraulic structure.



Rural Development: Regulating urban growth settlements in the Lake Victoria basin

Dr Obiero Ong'ang'a, Executive Director

CONFERENCE READER



10th International Living Lakes Conference 2005

15-19 May 2005
Tagaytay City, Philippines

Rural Development: Regulating Urban Growth Settlements In The Lake Victoria Basin

Dr Obiero Ong'ang'a, Executive Director

OSIENALA (Friends of Lake Victoria)

Lake Victoria Center for Research and Development

Dunga Beach, Kisumu. Kenya.

Phone +254-035-23487

Fax +254-57-22930

e-mail: osienala@swiftkisumu.com

Website: WWW.OSIENALA.ORG

Although East Africa is largely considered as a cradle of mankind, since the discovery of Proconsul Africanus at Rusinga Island, most of the present generation now living around Lake Victoria arrived in the second century. These communities moved to the lake basin from the rest of Africa, most of them from North and Central Africa. By 12th and 13th century, Lake Victoria region was well settled with vibrant society organized to utilize the resources. Population growth was tied to resources that were within the reach of the people and could be exploited with ease. This led to the rapid increase of the population around the lake basin. By 1999, the population had risen to approximately 26 million, with growth rate estimated at 3% per annum.

The highest population concentrations are found in the urban centers, which developed, from small fish landing bays, ports for the steamers or ships, to big towns and cities e.g. Kampala and Jinja in Uganda, Mwanza and Musoma in Tanzania, and Kisumu and Homa Bay in Kenya.

The urbanization growth around the lake was first thought to be a natural process in which surplus labour was gradually withdrawn from the rural sector to provide needed manpower for the urban industrial growth. It was considered as the main outlet to the elite members of the society who otherwise had very little to do in the rural areas. However, in contrast today it has resulted to a very negative result with many people leaving rural to towns and the establishment of many unplanned urban centers. In some urban centers the population increases by almost 50% at daytime and during market days it rises to about 64%.

The main constraint to Lake Victoria is the high pollution load released to the water system. Most of the big cities have no adequate waste management facilities and sewerage system; hence domestic wastewater and garbage end up in the lake. Kisumu sewerage system, for example was built for 150,000 people and today the population has arisen to over 600,000 using the same facilities.

This paper discusses the factors that have led to urban migration and the associated problems thereof.



Linking Community Human Development with Lake Conservation. Fundación Humedales involvement in Lake Fúquene, Colombia.

Dr. German I. Andrade, Project Coordinador

CONFERENCE READER



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Linking Community Human Development with Lake Conservation. Fundación Humedales Involvement in Lake Fúquene, Colombia.

Dr. German I. Andrade, Project Coordinator

Fundación Humedales

Calle 97 N° 21-42

Bogotá, Colombia

Phone +57-1-6164777

Fax +57-1-6164777

E-Mail: gandrade@fundacionhumedales.org.

www.fundacionhumedales.org

The integration of highland (2.500 meter) Andean Lake Fúquene (3000 Ha.) into the international Living Lakes prompted Fundación Humedales (a Colombian environmental NGO) to define a site intervention programme for the period 2000-2005. A conceptual framework based upon the ecosystem approach adopted by the parties of the Convention of Biological Diversity (CDB) was developed, a local community participation strategy was devised, and an institutional partnership proposed. The components of the defined programme are: (i) scientific research and environmental monitoring, (ii) biodiversity conservation and promotion of the protected area status for the area, (iii) natural resources management, (iv) public awareness and environmental education and (v) promotion of sustainable rural development. Having almost completed the time span of the Plan, a detailed description of the process and outcomes is presented, and a discussion on the scope and limitations of the achieved work is provided. Finally future perspectives for attaining the desired field impacts are outlined.

(i) Scientific research and environmental monitoring,

- Biodiversity inventories carried out, focusing on birds (emphasis on endangered and migratory species), fishes, an endemic freshwater crab, and aquatic plants. Indicators for monitoring are being proposed.
- A detailed habitat mapping process completed, based upon the use of satellite imagery and ground truth. A habitat description model was developed.
- A participatory biodiversity monitoring plan is being devised.

(ii) Biodiversity conservation and promotion of the protected area status for the area

- Assessment of the status of species of endangered birds in the site (relative abundance and absolute densities) carried out for Lake Fúquene. Pending for Cucunubá and Palacio wetlands.
- Assessment of the population status of 2 endemic fishes carried out.

- A demonstrative riparian forest restoration process initiated in a 1 Ha. land holding along the lake shore.
- A proposal for inclusion of Lake Fúquene in the List of Wetlands of International importance (RAMSAR developed). The Ramsar status of the area is being considered by the National Ramsar Authority.
- A proposal for internal zoning of the protected area is being developed, as a part of the biodiversity conservation strategy proposed by *Fundación Humedales*, and currently under review.

(iii) Natural resources management

- Participatory management plans for lake fisheries developed. A fisheries management plan is being proposed for the environmental authority (CAR).
- A community organisation scheme for fisheries management is being developed for the Rural Development Authority (INCODER).
- An inventory of reed harvesting processes has been concluded. A management plan for reed harvesting is being developed. Reed is used for elaborating handicrafts.

(iv) Public awareness and environmental education

- Permanent public awareness campaigns are being developed. Focus is made on understanding the process of ecological change of the lake, and valuing lake resources and environmental services.
- Production and dissemination of educational materials for Lake Fúquene (posters, educational games, etc.).
- Production for the Ramsar Convention of educational material for several Latin-American Ramsar sites.
- Extensive environmental education campaigns in local schools have been developed.
- Specific training on management skills for fisheries developed.
- Promotion of non-consumptive uses of birds (bird-watching tourism) is being done, through the training in bird identification of local young inhabitants.

(v) Promotion of sustainable rural development

- Feasibility studies for the use of aquatic weeds (invasive alien species) for fiber and organic manure developed.

Work has been possible thanks to generous contributions of: Global Nature Fund, Sika Andina, Unilever Andina, Global Environmental Facility GEF, Alexander von Humboldt Institute (Colombia), Conservation International Colombia, Scott Neotropical Fund, Ramsar Convention, U.S. Fish and Wildlife Service, Corporación Autónoma de Cundinamarca CAR. Society of Wetland Scientist (USA).



**Becoming Active:
The Nature Summer Camps**
Dr. Astrid Sebb, Head of Corporate Sponsorship

CONFERENCE READER



10th International Living Lakes Conference 2005

**15-19 May 2005
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Becoming Active: The Nature Summer Camps

Dr. Astrid Sebb, Head of Corporate Sponsorship

*DaimlerChrysler AG
COM/MS
HPC 1026
70546 Stuttgart*

After five years of constructive cooperation within the Living Lakes network, DaimlerChrysler invented the Nature Summer Camps together with the Global Nature Fund in 2003.

With the project "Nature Summer Camps", DaimlerChrysler is able to improve the consciousness of its employees towards a wiser use of environmental surroundings and a higher awareness of global correlations.

As DaimlerChrysler concentrates on projects where the company's core competencies can be applied directly to social and ecological issues, the Living Lakes network and especially the Nature Summer Camps give us the chance to give an extraordinary contribution to our corporate social responsibility.

Becoming active: the Nature Summer Camps

As an international group, DaimlerChrysler is represented on every continent on earth. The success of our products and services is built upon the commitment of more than 380,000 individuals around the globe. As a "global player", we answer for our actions to our customers, shareholders and employees, as well as to local authorities, national governments and society as a whole. Because of this, our business strategy explicitly provides for the company to play a responsible, proactive role in helping to shape our society worldwide.

We are convinced that social responsibility is an important factor for the long-term success of our company. This also applies for our shareholders, business partners and employees. Only then we can contribute towards world peace and prosperity in the future.

Heeding this responsibility, however, requires that we be competitive and remain so in the long term. Taking social responsibility is indispensable for a value-based company management.

For DaimlerChrysler protecting the environment is the logical expression of a responsible, farsighted attitude towards the use of natural resources. From engineering innovations aimed at reducing fuel consumption and the environmental impact of our vehicles to our in-depth research into fuels and advanced powertrains, we are busily engaged in protecting the planet. In addition, we

concentrate on projects where we can apply our company's core competencies directly to social and ecological issues.

Living Lakes

With its international placing and its global aim, the Living Lakes network is an ideal partner for DaimlerChrysler. Since 1998 DaimlerChrysler participates in the worldwide partnership in order to contribute to its corporate social responsibility.

DaimlerChrysler accepts the responsibilities as good corporate citizen and the UN Agenda 21. We have always looked for an opportunity to broaden our worldwide engagement together with the Living Lakes-partners in order to intensify the network. It has never been satisfying for us to support the project "only" financially, so we first applied our satellite technologies to monitor and analyse the lakes' situation. Furthermore, DaimlerChrysler was proud to be the first to introduce the "Nature Summer Camps" in 2003 together with the Global Nature Fund (GNF).

Nature Summer Camps

Since we know that credible environmental protection can only be performed with employees who practice responsibility every day, we decided to invent a project that focuses on this approach: the consciousness of the employees.

Idea:

Employees and their children spend their holidays in one of the Living Lakes' regions and work together with local organisations in environmental projects.

Goal:

Support of the protection and development of lakes with manpower, involvement of our employees in order to make them aware of environmental issues throughout the world and the right way to deal with these issues

Results:

- Almost 60 employees of DaimlerChrysler worked voluntarily in the Nature Summer Camps 2003 at destinations such as Mono Lake/USA, La Nava/Spain or the Pantanal/Brasil.

- In 2004, the Deutsche Lufthansa which had heard of the overwhelming success of the first version joined the fascinating project as an equal partner. Together we brought 85 volunteers from both corporations to seven lakes, e.g. Nestos Lakes/Greece, Lake Chapala/Mexico or St. Lucia Wetlands/South-Africa. The participants stayed between two and four weeks and engaged in studying plant and animal populations, measuring and analysing water samples or elaborating school class materials.

- In 2005, the third edition of the Nature Summer Camps heads out for Lake Poyang/China, Lake Võrtsjärv/Estonia, Lake Baikal/Russia and St. Lucia

Wetlands/South-Africa. About 60 participants are looking forward to make their contribution abroad.

- In feedback surveys participants and local partners expressed their great satisfaction. Many employees of DaimlerChrysler even stated their readiness to continue their commitment for environmental protection at home.

Being part of the Living Lakes Network means commitment and responsibility for DaimlerChrysler. We want to become active and to live up to the idea of a network together with our partners. With the dedication of our employees we think we can contribute to the success of the existing partnership which has grown over years. Moreover, DaimlerChrysler is able to promote and demonstrate ecological awareness and ambition together with the Living Lakes Network.

Last but not least: DaimlerChrysler wants to thank you for your confidence and your cooperation during the last seven years. We are proud to be a member in the Living Lakes network.



Examples for Environmental Initiatives of Business Companies: Kärcher Germany Frank Schad

CONFERENCE READER



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Examples for Environmental Initiatives of Business Companies: Kärcher Germany

Frank Schad

Press Officer

Alfred Kärcher GmbH & Co. KG

Alfred-Kärcher-Straße 28 - 40

71364 Winnenden

Tel. 0 71 95/14-21 96

Fax 0 71 95/14-21 93

Back in 1996, Kärcher became the first company in its sector to receive ISO 14001 certification for the environmental management system at its Winnenden location.

The aim of our environmental management system is to ensure that environmental aspects are taken into account in all our actions and decisions. This applies to the design of new Kärcher products, the choice of production technologies, production, construction works, employee training and motivation and much more besides.

Here are some examples of our environmental activities:

Communication and Motivation

Kärcher Campaign for Environmentally Friendly Journeys To Work

The campaign for environmentally friendly journeys to work was started in spring 1994. Now, this mobility concept covers various measures to encourage environment-friendly use of public transport, bicycles and cars.

- Anyone who comes to work by bicycle receives a cycle card from the porter. It is stamped every time he or she cycles to work. Cards with 20 or more stamps take part in a raffle at the end of the year (first prize: € 870.00).
- Kärcher pays 50% toward weekly, monthly or annual season tickets on local public transport (75% for trainees).
- Kärcher participates in the Stuttgart metropolitan transport authority's Jobticket campaign. Multiple ordering of annual season tickets reduces costs even more.
- Employees who have to use a car to come to work can use the intranet to make car-sharing arrangements.
- Fuel-saving courses are designed to help cut fuel consumption on business and private journeys. These courses are sponsored by the federal state of Baden-Württemberg, with Kärcher paying the remaining costs.
- The first fuel-saving competition was held in 2003. Fuel consumption by the company's fleet of vehicles on business trips to a production facility near Schwäbisch Hall was calculated.

- Employees who come to work in an electric car can recharge its battery free of charge on the company site during the daytime.

Employee Information and Motivation

- Regular environmental training courses (internal and external)
- Kärcher environmental bulletin
- Kärcher campaign for environmentally friendly journeys to work
- Notices, company magazine
- Recycling Art, an exhibition of pictures made from old beverage cans by artist Christoph Menger
- Kärcher intranet and Kärcher website
- Fuel economy courses and fuel saving competition
- Environmental campaigns by trainees and BA students (biotope maintenance and improvement of waste separation in administration)

Product-Related Environmental Conservation

New Focus:

About two years ago, Kärcher identified a new focus of attention for environmental efforts within the company – the product. As a result, the work of the central environment department in Winnenden is concentrated largely on considering the environmental implications of products.

At Kärcher, environmental aspects are fully integrated into the development process. Environmental issues are taken into account already during strategic planning to ensure a sustainable product strategy.

The development of products involves taking into account numerous environmental aspects such as emissions and noise, the avoidance of harmful chemicals, reduction of power and water consumption, etc. This is done with the help of a product-specific environmental checklist drawn up by the central environment department.

The integration of the quality and environment departments in 2003 made it possible to use existing quality assurance processes. Handling of environmental checklists and achievement of specific target values are monitored in quality gates. This system of monitoring ensures that statutory requirements and also Kärcher's internal standards and voluntary targets are achieved. The important thing is for environmental aspects to be treated like ordinary quality features.

Kärcher Environment-Friendly Products Standard

Kärcher's Environment-Friendly Products standard requires among other things recyclability, avoidance of harmful chemicals, environmentally friendly packaging of Kärcher products, etc. Two further sections are planned for 2004 and are set to give even greater priority to product use and product characteristics (inter alia emissions, energy and water consumption).

Research and Innovation

In product development, the company endeavours to take a holistic view of the entire product life cycle. In the context of a cooperation agreement with Darmstadt University of Technology, regular ecological appraisals of Kärcher products (similar to ecological balance sheets) are carried out. The results of these appraisals are incorporated into future product developments.

As part of this cooperation, what is probably the first ecological appraisal of a pressure washer was carried out, using a Kärcher model as an example.

Kärcher sets great store by innovation. This includes taking environmental innovations forward. The first automatic floor cleaner powered by a fuel cell is being tested in one of our German factories.

Building Works and Environmental Protection within the Company

Environmental aspects are taken into consideration when building works are undertaken. In addition to planting greenery on roofs, thermal insulation, heat recovery, a solar power station (photovoltaic) and a solar system for processing hot water, we place special emphasis on identifying and cleaning up harmful waste from previous eras.

Geothermal system

A building now undergoing construction is being fitted with a geothermal system. Up to 80% of the power required to heat and air-condition the building will come from regenerative energy.

Sixty-six concrete piles that reach up to ten metres below the earth's surface, each up to 120 cm in diameter, contain a system of pipes filled with a mixture of glycol and water. The earth's heat is drawn on via these pipes.

This system will save approximately 6,000 litres of heating oil and 20,000 kWh of electricity per year, thereby avoiding roughly 26,000 kg of carbon dioxide emissions.

Solar power station

The largest solar power station in the Rems-Murr district.

Some examples of water- and energy-saving measures

- Recycling of water used for testing and use of water recovered from groundwater clean-up at the Winnenden location greatly reduced the use of drinking water.
- Water recycling system at the Bühlertann works – 90% reduction in use of drinking water for testing models

- Heat recovery in various places – examples, Winnenden location – waste heat from compressed air plant is fed into the heating system – waste heat from production processes assists shed heating and is used to heat shower water, improvement in thermal insulation in various buildings (roof, facade, windows).

Environmental Awards

- Environment prize for companies 2004, Industry Division, Baden-Württemberg Environment Ministry
- Commended in competition for environment prize for companies 2002, Industry Division, Baden-Württemberg Environment Ministry,
- Second prize in competition to find the best motivator for environmental conservation at work, Chamber of Industry and Commerce, Southern Upper Rhine, and Baden-Württemberg Ministry for Transport and Environment, 1998
- Winnenden municipality environment prize 1993
- New kind of Kärcher cleaning agent won innovation prize for sustainable cleaning.

Continuous Improvement

Environment programme updated annually

All departments are asked to nominate environmental targets each year. The TOP 20 targets for the official Kärcher environment programme are compiled from these targets. This ensures a continuous process of improvement. An extract from the environment programme is enclosed.

Current and future projects

- Further development of our environmental management system by achieving a uniform environmental standard worldwide (ISO 14001 certification for foreign production locations, too)
- Integrated management system (environment and quality)
- Even closer attention to be paid to environmental aspects of Kärcher products (such as storage of material data to identify environmental impact throughout the product life)
- Preparation for EU-wide return of old electrical appliances and the associated bans on certain materials
- Kärcher working group on sustainability
- Testing use of slip sheets – packing without wooden pallets makes possible considerable savings on materials, avoidance of waste, energy savings during transportation, etc.