Kathmandu Participatory River Monitoring – A Model for South Asia Methodology and Lessons Learned

Rainer Mutschler-Burghard[1)], Prachet Shrestha[2)], Yogendra Chitrakar[2)], Ram Maharjan[2)], Sushil Anu[2)], Ronjon Chakrabarti[1)]
1) Adelphi Research, Caspar Theyss Strasse 14a, 14193 Berlin, Germany, mutschler@adelphi-research.de
2) Environmental Camps for Conservation Awareness (ECCA-Nepal), Wise Use House, P.O. Box 9210 Jwagal, Kupandol, Lalitpur, Nepal, ecca@mos.com.np

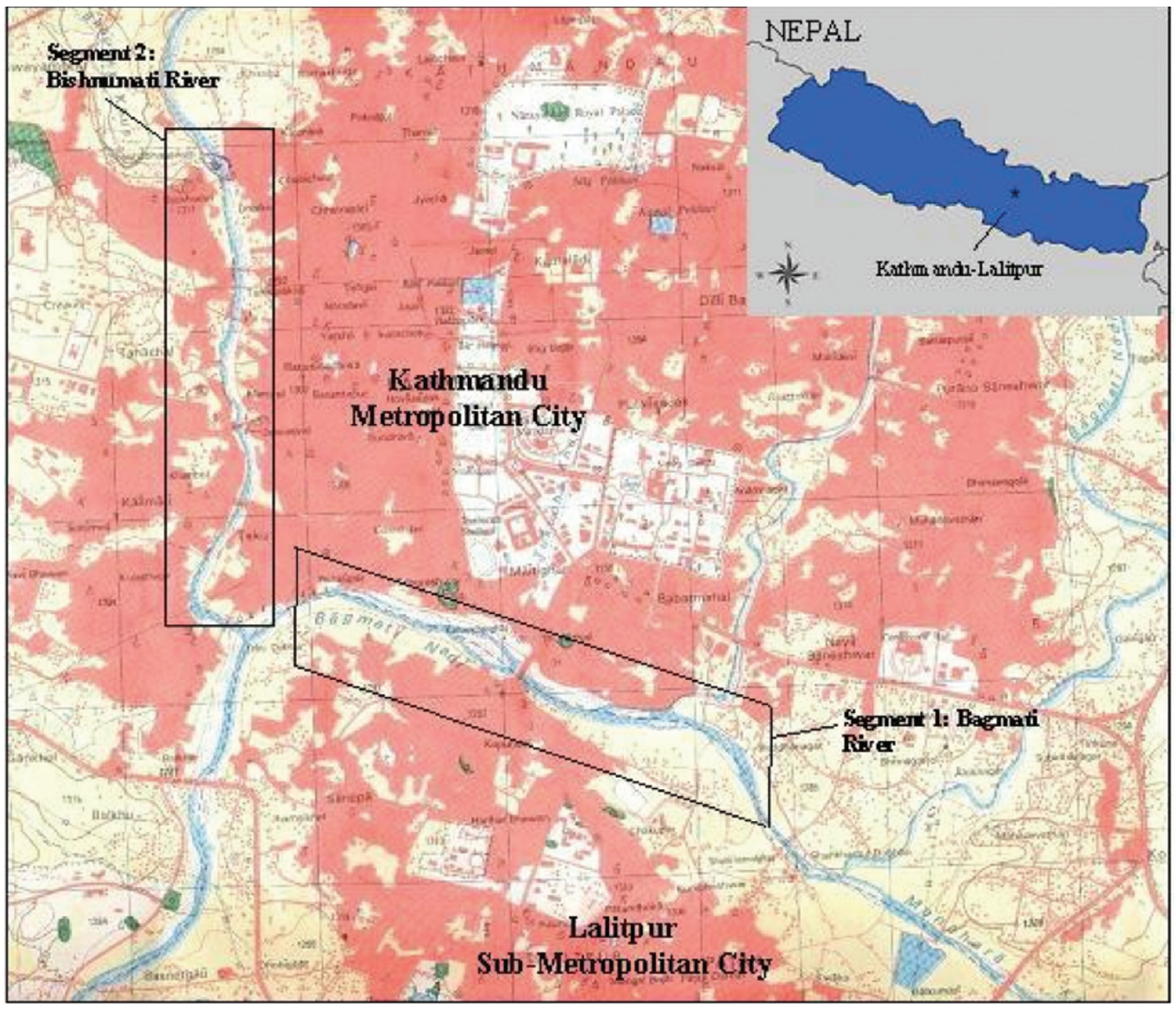
Only twenty years ago people were swimming in Bagmati River. Water even met drinking water quality. Increased urbanisation has worsened the situation drastically. All domestic and industrial waste water is discharged directly into rivers. Due to lack of resources and expertise, an adequate and sustainable monitoring system for the rivers could not be set up and permanently operated. Adelphi Research – Germany, ECCA – Nepal and ITC – The Netherlands therefore developed the project Kathmandu Participatory River Monitoring (KAPRIMO) that took into account the various reasons for the insufficient operation of former monitoring systems. As a pilot step, KAPRIMO strengthened the river monitoring system in Kathmandu-Lalitpur, making it more reliable and sustainable.

The growing population and the high density along the banks of the rivers in the urban agglomeration of Kathmandu and Lalitpur as well as a lack of proper sewage and waste management capacity has led to a serious deterioration of the ecosystem within the Bagmati River Basin. The decline of river quality has direct detrimental impacts on the health of water user groups in the city and downstream. While these deficits are recognised and environmental legislation has been put in place accordingly, no appropriate measures have so far been taken to install a permanently operating river monitoring system in Kathmandu-Lalitpur due to lack of funding and expertise.

Some attempts have been made by the Nepalese government to run a river quality monitoring system on regional basis, but sustainability could never be achieved. In the early 1990s the mandate of the Department of Hydrology and Meteorology (DHM) under the Ministry of Environment, Science and Technology (MOEST) was extended to water quality assessment. With the help of the German Development Service (DED) a water quality laboratory was set up and monitoring of rivers in Kathmandu Valley was done three times per year.

The KAPRIMO Approach

Kathmandu Participatory River Monitoring (KAPRIMO), a project co-funded by the European Commission under the Asia Pro Eco Programme, took into account the various reasons for the insufficient operation of the existing monitoring system of DHM and followed thereby the recommendations of the Nepal Water Resource Strategy 2002. Basing on the work done by DED, the project strengthened the river monitoring system in Kathmandu-Lalitpur, in order to make it more reliable and sustainable. In two urban river segments sampling frequency and parameters were increased and adapted. Moreover water quality data are related to water discharge and meteorological data, in order to facilitate future environmental planning.
A decentralisation process and thus a relief of DHM has been initiated by integrating the competent local municipalities into the monitoring process. Volunteer teams partly took over the responsibilities for sampling and analysing activities in the two chosen river segments. The monitoring system is kept simple and is based on low investment as well as low operational costs. As no reliable monitoring system and thus no regular water quality data on Bagmati river catchment existed in Nepal before the project, the focus of KAPRIMO was on cost efficient and reliable implementation. The system is designed according to international monitoring standards of the scientific community. Nevertheless local authorities have the liberty and flexibility to adapt the monitoring system if necessary. The ownership is increased thereby.



Two defined river segments of KAPRIMO

2 Objectives

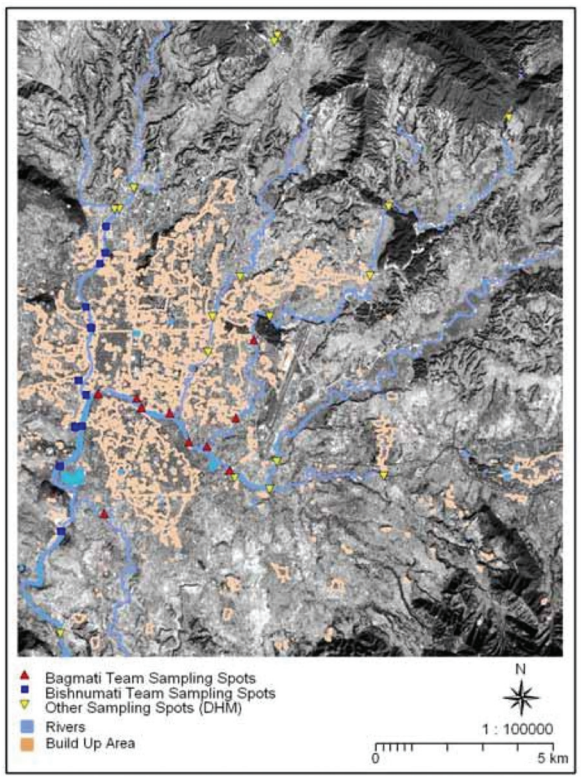
The key objective of KAPRIMO is clearly defined as a regular availability of river quality data of the two targeted river segments meeting established Nepalese standards. Furthermore the monitoring process will set goals for the water quality of rivers that will lead into follow-up project proposals for improvement measures on the river segments. As the project

is designed in a manner to be replicated on a regional, national or even international level, it is expected that KAPRIMO is a catalyst for basin-wide, or even country-wide river monitoring and planning. The different monitoring objectives in detail:

- Strengthening the existing monitoring system of DHM by municipality-led river segment teams, increased frequency of sampling & analysis
- River quality and hydrological data are more regular and more reliable, providing easy access to river quality information
- Networking among authorities - No boundaries between administrations
- Foundation for segment-wise development projects and basin-wide pollution control programmes
- Networking approach, create interest among people, transparency, motivate people

2.1 River segments and sampling spots

Kathmandu Valley is one of the largest drainage basins of Nepal. The valley includes three districts: Kathmandu, Lalitpur and Bhaktapur. It elongates about 30 km east-west and about 25 km north-south. The total area is about 656 square km. The river system of Kathmandu Valley is named after the main river Bagmati. The origin of the river is located northeast of Kathmandu Valley in the midhills of Shivapuri (2731m asl).



Sampling spots of KAPRIMO

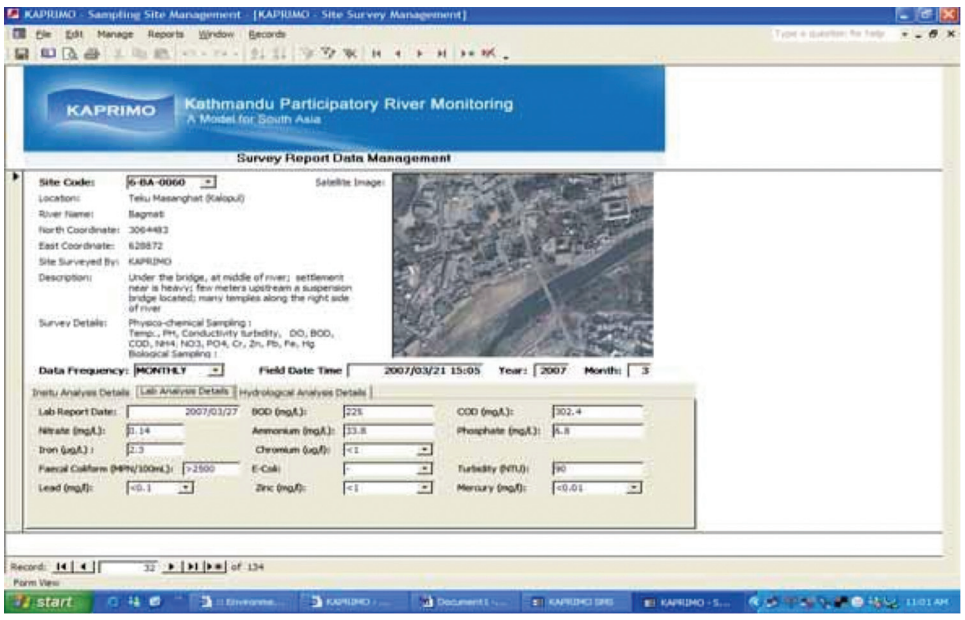
3 Implementation of the Monitoring System

The KAPRIMO monitoring system has been realised through a wide range of activities. Initially a broad needs assessments survey and a comprehensive legal analysis have been conducted. Awareness raising activities among all stakeholder groups were followed by the constitution of the monitoring teams. Monitoring teams as well as relevant authorities were trained in sampling and analysis activities as well as in GIS data-management. The monitoring programme started officially in January 2007.

3.1 Data collection

As already laid down above, KAPRIMO not only focuses on reliable and easy accessible data, but on decentralisation and sustainability of the monitoring system. A special attention was given to the organisational set-up of the new monitoring system and the integration of the old DHM system. The river monitoring system of KAPRIMO was designed and adapted according to the local needs and the result of the comprehensive assessment conducted at the beginning of the project KAPRIMO is regularly monitoring physical-chemical, biological and hydrological parameters.

It started with 10 physical-chemical parameters (Temperature, pH, DO, Conductivity, BOD_5, COD, Turbidity, NO_3, NH_4, PO_4) plus heavy metals - displaying a broad picture of the river quality condition. "Heavy" metals (Fe, Cr, Zn, Pb, Hg) are measured at only 8 spots, as the analysis is very costly. The biological parameters of faecal coliform bacteria and macroinvertebrates have been integrated in the monitoring system as they have a direct link to human health. The seasonal analysis of macroinvertebrates (2 times per year) is undertaken at 9 sampling spots. Faecal coliforms analysis (MPN) is done on a monthly basis at 15 sampling spots. Hydrological data (river discharge) are taken at 7 selected sampling spots, in order to provide a link between discharge, meteorological data and water quality.



Online monitoring results on www.kaprimo.org

The regular sampling of KAPRIMO is established monthly at all sampling spots within Bagmati and Bishnumati river segment (21). All sampling spots outside the defined river segments (19) are sampled at a reduced frequency of 3 times a year (pre-monsoon, monsoon and post-monsoon) as done by DHM already before.

3.2 Data Management and Interpretation

For the management of field and lab data, a MS Access database has been developed especially for KAPRIMO. Following the participatory approach of KAPRIMO, it is possible for everyone (using an internet connection) to view the monitoring results on the website www.kaprimo.org. All field and lab data of 40 sampling sites are online and can be queried using different patterns. Being a pilot project, the database can be expanded with more sampling points and river basins, more parameters or according to other necessities which might occur after the project.

The physical-chemical parameters are summarised and weighted with the help of Bach Water Quality Index.
The biological data obtained are evaluated using the Saprobic Water Quality Classes for four South-Asian countries (Ganga River System (GRS)/ Average Score per Taxon (ASPT)).
For data interpretation and adequate display of results, relevant authorities have been trained and supplied with the GIS software ILWIS from the Dutch project partner ITC. For example both water quality indices mentioned above, are displayed with the help of GIS (ILWIS) maps. Moreover main pollutants, illegal drainage and waste dumping are recorded by GPS, digitised and analysed with the help of the GIS software.
The first monitoring results of KAPRIMO as well as detailed data interpretation are covered by a separate paper.

4. Conclusions and Recommendations

Due to the intense planning and detailed description of roles and responsibilities of project partners and beneficiaries, there were only few complications while implementing the project. The project participatory approach helped to smoothly involve different stakeholders and governmental authorities. Difficulties mainly originated from political disturbances and regular substitution of decision makers. Financial commitments as well as general decisions have to go through a long row of responsibilities until an agreement is sealed and signed. As a consequence, for a long time the local partner ECCA took over responsibilities originally foreseen for local authorities. Through intense negotiations and never ending personal efforts, the monitoring system is fit for the future with clear responsibilities and a fair and transparent remuneration system for the various monitoring services.

Thus Kathmandu-Lalitpur benefits today from KAPRIMO by a functioning river monitoring system. More transparency concerning quality data, easy access to information led to an increased awareness and consensus among stakeholders and local population. The future funding of the monitoring system has also been negotiated and is under the responsibility of local municipalities and project partner ECCA.

The project was designed to be a starting point for basin-wide or even country-wide river monitoring and planning.
The detailed documentation of KAPRIMO will facilitate the integration of a river monitoring system in other parts of Nepal or South Asia. Training courses and the joint operation of the monitoring system by two different municipalities and several governmental institutions and other stakeholders will pave the way for trans-boundary administrational cooperation.

KAPRIMO linked key authorities and stakeholders and has identified the main problems in regard to the deteriorating water quality of rivers and streams. Capitalising on these valuableoutputs and the established network of governmental as well as non-governmental stakeholders, the situation in Kathmandu Valley must be improved. Governmental institutions, up to the ministerial level are earnestly willing to take up their responsibility for the first time and give the people something that is laid down even in the constitution: a basic human right - CLEAN WATER. The present political change will help to keep up this motivation.

5. Acknowledgements

This document has been produced with the financial assistance of the European Union. The contents of this document are the sole responsibility of the project partners and can under no circumstances be regarded as reflecting the position of the European Union.

References

Government of Nepal 2002: Water Resource Strategy Nepal. Water and Energy Commission Secretariat, GON Singha Darbar, Kathmandu.

Government of Nepal/ World Bank 1994: Bagmati Basin Water Management Strategy & Investment Programme. Ministry of Housing & Physical Planning, GON/World Bank, Kathmandu.

MOPE 1999: Environmental Planning and Management of the Kathmandu Valley. MOPE, Nepal.

Mutschler R., Shrestha P., Chitrakar Y. et al. 2007: Kathmandu Participatory River Monitoring (KAPRIMO) – A Model for South Asia; Concept of the River Monitoring System, First Edition January, 2007 (unpublished)

Paudel, Arjun: Environmental management of the Bagmati River Basin. Case Study 28. In: UNEP (United Nations Environment Programme): Studies of EIA Practice in Developing Countries.

Pradhan, Bandana 2005: Water Quality Classification Model in the Hindu Kush-Himalayan Region: The Bagmati River in Kathmandu Valley, Nepal.

Sah, Ram Charitra 2006, Kathmandu Participatory River Monitoring: LEGAL ANALYSIS and RECOMMENDATIONS, ECCA-Nepal (unpublished)