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The town of Nakuru—Kenya's fourth largest town—lies in a unique setting in the Great Rift Valley (Figure 1). Recent developments on the Menengai Crater, the Mau Escarpment, and the Bahati Highlands exemplify the impacts of poorly planned urban growth on mountain ecosystems. The Nakuru Local Urban Observatory (LUO) project was initiated by the Municipal Council of Nakuru in January 2003, in collaboration with the Centre for Development and Environment (CDE) of the University of Berne and the Intermediate Technology Development Group (ITDG), and with funding from the Swiss Agency for

Development and Cooperation (SDC). The project aims to provide a framework for sustainable urban development practices by building technical skills and improving participation by local stakeholders in decision-making processes. The potentials of information technology (IT) are being tapped to provide up-to-date information to decision-makers and democratize access to information, in order to improve public participation. The overall objective is to find ways of achieving better urban management in order to mitigate non-sustainable development trends in the town and its surroundings.

The heart of the Rift Valley

Nakuru, the capital of Kenya's Rift Valley Province, is located 160 km northwest of Nairobi, along the Kenya–Uganda highway, at an altitude of 1800 m. Founded by the British colonial authorities at the beginning of the 20th century as a station along the Ugandan Railway, the town later became a service center for a fertile agricultural hinterland occupied by white settlers. Nakuru has retained an agrarian character obvious to visitors by the large

number of veterinarians and agricultural machinery traders along the town's roads. Nakuru is Kenya's fourth largest town and is growing at a rate of 7% annually. Overcrowded and partly unsanitary low-income settlements with poor services at the southern edge of the town are the most noticeable consequence of this rapid growth.

On the northern side of town, the Menengai Crater (2490 m)—one of many extinct volcanoes in the Rift Valley, on the

FIGURE 1 Nakuru town in the Bahati Highlands. Located partly outside the municipal boundaries, this part of town is undergoing rapid urbanization at the expense of valuable agricultural land. (Photo by Albrecht Ehrensperger)



Unique and vital natural resources and services in Kenya

Lake Nakuru National Park

The area around Lake Nakuru was gazetted in 1968 and has since become one of Kenya's most popular national parks, mainly because of easy access and abundant wildlife. Owing to the ecological uniqueness of this shallow alkaline lake, which harbors up to 1.5 million flamingos and over 450 other bird species, the national park was also listed in 1990 as a wetland of global importance.

Lake Nakuru National Park is under increasing pressure from Nakuru town: The last rows of houses in some of the town's informal settlements are literally leaning against the electrified fence surrounding the park. Poor management of solid waste and lack of control of industrial pollution pose a serious ecological threat, as does illegal sand harvesting along the Njoro River, which, together with the dramatic deforestation taking place in the Mau Escarpment, contributes substantially to accelerated siltation of the lake.

The Mau Escarpment and Bahati Highlands

The Mau Escarpment, to the west of Nakuru, is one of Kenya's most important water towers. It also features some of the largest remaining indigenous forests in East Africa. Lake Nakuru, Lake Baringo, and the world famous Masai Mara game reserve depend on water originating from the Mau, where dramatic forest loss has been recorded, especially since the mid 1990s, leading to severe alterations in the flow regime of major rivers feeding Lake Nakuru. This trend is threatening the stability of the lake's ecosystem.

Because the National Park, the Menengai Crater and tectonic faults hinder urban expansion to the south, north and west, the Bahati Highlands, on the eastern side of town below the Aberdares Escarpment, are undergoing rapid urbanization. Expansion is destroying valuable agricultural land and threatening important groundwater reserves. In both the Mau and the Bahati, mismanagement of resources, haphazard planning, and construction practices are the root causes of non-sustainable development trends.

lower slopes of which a portion of the town is built—is an imposing landmark and a bulwark to urban expansion, owing to its topography and its legal status as government-owned, protected land. This 12-km-wide crater, among the largest of its kind in the world, represents significant, but so far barely tapped potential for tourism. Rising 1000 m above the Rift Valley, the Mau Escarpment and the Bahati Highlands frame the town to the west and the east, while Lake Nakuru National Park completely restricts urban expansion to the south (see Box and Figure 2).

Impacts of urban growth

The outer gentle slopes of Menengai have increasingly come under pressure from competing land uses. Permanent urban expansion has reached the edges of protected forest land, while informal settlements are mushrooming inside. A broad area has been converted to crop and grazing land, and only a few acres of mature

FIGURE 2 Digital terrain model of Nakuru and surrounding areas. (Map by authors)

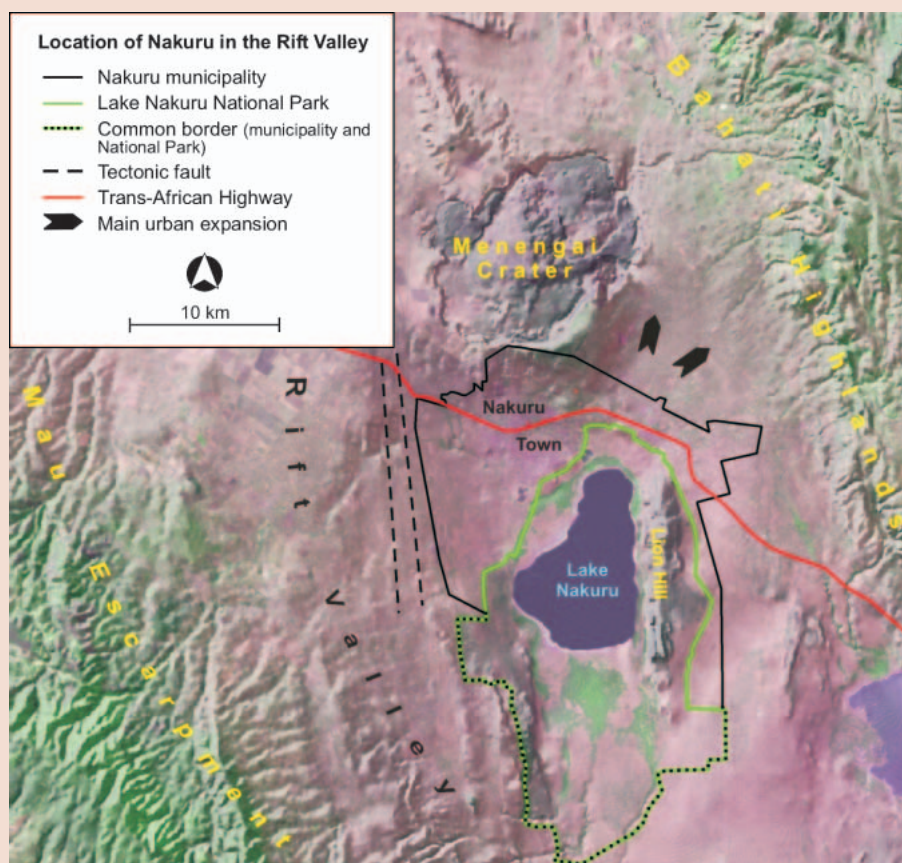


FIGURE 3 After every heavy rainfall (a daily occurrence in the rainy season), this road leading to the crater is transformed into a river. The sediment-loaded water reaches high speeds and carves deep gullies into the road, rendering it impassable at times. The fragile volcanic soils are washed away as a result of deforestation, inappropriate land use practices and overgrazing. (Photo by Albrecht Ehrensperger)

plantation forest are left. Other plantations never reach maturity, as the impoverished communities cut and sell young Eucalyptus stems to Nakuru's booming building industry for use as fence poles and props for castings.

The scramble for resources on the mountain slopes, which is mainly a result of poor planning, lax implementation of land use regulations, and lack of economic alternatives for local communities, is already having negative consequences. For example, fragile volcanic soils, now exposed to tropical rainfall, are regularly washed away into the town, where they flood compounds, block sewerage, and cover roads with a slippery coating (Figure 3). The very existence of Nakuru town depends on the stability of the slopes of Menengai, a fact that apparently has not found its way into public awareness or onto the agenda of local decision-makers: No local action is currently being taken to prevent further

damage, leaving national land use policies as the only, often unsuitable control mechanism for sustainable land management. The same is true for deforestation of the Mau and haphazard urbanization in the Bahati Highlands, which continue unchecked by any coherent local mitigation efforts.

Though there appear to be many reasons behind the obvious lack of planning and implementation capacity at the local level, we believe that 2 aspects are critical:

1. Access to reliable and up-to-date information on urban development issues is virtually impossible for the average citizen and complicated by loopholes for most local officials, owing to restrictive data exchange policies and blurring of facts by individuals engaged in covering up illegal practices. Detailed survey data are not retained locally but conveyed to the national level, where aggregate reports of no use in local decision-making are subsequently published. However, local policies that promote implementation of sustainable projects which earn community recognition can only be formulated if decision-making leading to these policies is based on information rather than assumptions, and if participation of local stakeholders can be ensured. Neither current data exchange policy and data processing mechanisms, nor the level of local awareness, facilitate informed decision-making and public participation.
2. In Kenya's centralized government, decisions are often imposed by the ministries without consideration of local characteristics. Such was the case on 31 March 2004, when grazing in forest areas was banned. The Menengai forest is also affected by this well-meaning decision that aims to protect Kenya's dwindling forests. However, some cattle herders claim that grazing on Menengai plays a vital role in the prevention of bush fires. From an enlightened point of view, a controlled grazing-cum-forestry land use system would probably be the most beneficial alternative, taking into account both ecological imperatives and local communities' econom-



ic needs. But the current style of devolution of power, which excludes grass-roots participation, does not allow for differentiated decision-making and, above all, sustainable implementation of such a land use system adapted to local needs.

Information and dialogue

The Nakuru Local Urban Observatory (LUO) project aims to develop an information system that will help monitor urban development by providing baseline information and development indicators to assist planners in making informed decisions. Thus, it plays a crucial role in addressing the two critical aspects outlined above:

1. It makes relevant information on urban development issues available to a broad base of stakeholders, therewith providing a necessary basis for improved public participation.
2. It constitutes a medium that local authorities can use to foster vertical dialogue among themselves, and with the national authorities and the community, and to enhance horizontal dialogue between their different departments.

The project brings together municipal officers and development partners (community-based organizations, NGOs, professional corporations, universities and international agencies) and helps them to identify the most urgent development needs and negotiate prioritization of implementation in various parts of town. Urban development indicators are assessed in a spatially differentiated manner, for example at the level of electoral wards, thus providing a valuable tool for comparing the status of urban development in relation to administrative units, and for monitoring the development of aspects such as shelter, economic development, environmental management, and social development (Figure 4).

Participatory processes

The data added to the LUO information system are gathered at the neighborhood

FIGURE 4 The inability of public institutions to cope with rapid urban growth has led to the formation of vast and poorly serviced informal settlements at the southern edge of town. The LUO project now enables stakeholders to monitor urban development according to different criteria, including socioeconomic ones. (Photo by Albrecht Ehrensperger)



level, in a participatory manner (Figure 5), and complemented with statistics from various sources. Community representatives use high-resolution satellite images to map information layers, which are later prepared by the LUO project team for analysis in a GIS environment. Data collected in this manner have a high accept-

FIGURE 5 Representatives from the community map different layers of information onto enlarged satellite images. The bulk of the database used in the LUO project was generated in this manner and completed with information from local authorities. (Photo by Albrecht Ehrensperger)



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ance value and stand a good chance of triggering debate at several levels, affording individuals an opportunity to air their views on various development issues.

The main information exchange interface of the LUO project is a computer application with basic GIS (Geographic Information System) functionality called NakInfo. This application was programmed by the LUO team on the basis of a similar initiative conducted by the Swiss Federal Institute of Technology in Senegal. NakInfo enables users to view different information layers and urban development indicators as maps on the background of a satellite image. Tabular information on displayed map elements can be viewed by clicking on these elements. The software is an interactive tool, as it allows users to propose modifications of current data, both in words and as drawings on the map interface. Finally, the software allows users to enter existing or planned urban development projects into the database.

NakInfo requires only minimal computer literacy and features help menus in Kiswahili in order to be as inclusive as possible. The Municipal Council has committed itself to providing an information center at its offices, where the public will access the application. Collaboration with cyber cafés in town has also been sought as an additional means of disseminating information.

The LUO offers a unique opportunity to dispel mistrust between the community and the local authorities, as it promotes the active involvement of stakeholders in urban development and also provides local authorities with a tool and a database that they can use in formulating policies adapted to the local context. In the case of the grazing ban mentioned above,

an adapted policy allowing locally controlled grazing on the Menengai Mountain within the limits imposed by environmental sustainability would probably earn much higher acceptance from the community, and its implementation would therefore be more realistic than the current ban ordered by the central government. The LUO will make it easier for local authorities to make clear the importance of such considerations to the central government, and for the community to present their arguments on urban development issues to local authorities.

Challenges

The LUO initiative in Nakuru has demonstrated its potential and earned a very positive response from a broad circle of stakeholders. However, several challenges must urgently be addressed. Among them the following are critical:

- The LUO needs to deal with people's needs and interests if it is to remain relevant. Demonstrating that a monitoring system can have a positive impact on urban development will go a long way towards building people's confidence.
- Periodic updating of information with the active involvement of the community will be necessary, but will be a significant cost factor.
- Local patronage and a firm commitment from the local authorities to pursue the initiative will have to be secured. This constitutes a difficult challenge, considering the weakness of the structures and the poor financial basis of the local authorities. Income-generating activities, such as the sale of data and services, will certainly help in tackling this challenge.

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