

Integrated Watershed Management – A successful tool for adaptation to climate change

Water and soils are increasingly becoming a limiting resource for meeting the food requirements of a growing world population. Integrated concepts for managing natural resources in a sustainable and environmentally sound manner show encouraging impacts, if applied on a large scale and over a long period like in Tigray, the northernmost regional state of Ethiopia.

Agriculture accounts for almost two-thirds of freshwater consumption worldwide. Efficiency of water use or water application is often far below 50 percent, mainly due to conveyance losses in inefficient irrigation systems or uncontrolled water application. Only 12 percent of freshwater is used for providing drinking water to the growing world population. Less than 50 percent of the world population has access to potable water from safe sources. More than 50 percent of all piped water is wasted as a result of leaking pipes in the urban centres of the world. The provision of high-quality drinking water requires treatment depending on the source as well as effective demand of the end-users. Only 20 percent of the potable water used in industrialised countries is required for drinking, food preparation and hygienic purposes (Foerch 2008).

Climate change is affecting the spatial and temporal availability of water resources, there being either too little, too much, or too dirty water (Kundzewicz 2007). In the more developed countries, people can afford to pay the higher cost of purified water. However, in rural and urban Africa,

it is not the inability of people to pay for the full cost of drinking water, but rather the lack of capital to invest into efficient water infrastructure and its efficient operation. The poorest of the poor often pay more for drinking water of limited quality than the rich – in the same city. They pay even more than people in the rich North who receive piped water of high quality in their apartment 24 hours a day. Better cost recovery will not redress this, more public investment might.

Decentralisation may also help to improve the quality of water supply: Germany has more than 5,000 water companies, of which about one third are public, one third private, and one third owned by water users associations. In developing countries such as Kenya, the urban poor probably have no more than two hours of drinking water per day, and even then, the bucket still needs to be carried home over an average distance of about 100 metres. And the water stored at home

is a source of diseases since the containers rarely get cleaned or protected against contamination.

IWM – Integrated Watershed Management

The urban poor – in the near future almost 50 percent of the world's population – are facing limited access to drinking water and sanitary facilities. The rural poor – who often settle in peri-urban areas – suffer from insufficient land and water resources for their sustenance. Food production for the urban population is almost impossible since only limited amounts are produced for the markets. Shortages of land or water or of both need to be addressed. Water professionals are increasingly promoting the concept of integrated water resources management (IWRM), since it is the only approach capable of balancing growing demand for a limited resource with a sustainable resource base.

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Watershed management in Tigray

One special focus of German Development Cooperation with Ethiopia was and still is the “green” sector or natural resources and food security. The present SUN project is the culmination of long-term inputs of various kinds, starting with horticultural development in the 80s, introducing participatory land use planning and watershed management concepts for sustainable food securities in the 90s. In Tigray – one intervention area of the last decade – the focus lies on watershed reclamation and water harvesting techniques to enable local agricultural production. From gully reshaping through rainwater harvesting with ring dams and ponds to re-vegetation of badlands and hill-slopes, the measures are implemented by the regional government with relentless inputs of the farming communities. Establishing of watershed associations may now lead to a sustainable further development of resources with due protection of water and soil resources.



Photo: Förch

Most modern water laws favour integrated solutions at basin level (EU, 2000), which allow comprehensive solutions acceptable to all stakeholders and flexible targets for managing the process with regard to institutional capacities and human capabilities. In East Africa, the IWRM concept has been applied successfully at watershed level following comprehensive water sector reform. It is essential for these concepts to integrate the water users to balance growing demands with dwindling resources and thus ease conflicts between competing users. Water Resources Users Associations like in Kenya take over responsibilities for protecting and managing the water and soil resources in their watersheds. Participatory Sub-catchment Management Plans have become a tool for sustainable management including conflict transfor-

mation between competing users (IWMNet 2007).

The IWM approach takes a holistic view of the catchment by adopting a multi-sectoral approach for all resources – soil, water, biomass, energy – and at the same time taking into account both human and environmental needs. Its main concerns are water resources development for rural water supply, including small-scale irrigation, and the protection of available water resources against overuse and pollution. The overall aim is to improve local livelihoods and community-based resilience against natural disasters. The process of participatory watershed management planning as implemented within the water sector reform in selected river catchments in Kenya forms the basis for successful resource utilisation. Environmental and development problems as well as

Farmers in the Tigray SUN project prepare their land for rainwater harvesting by gully reshaping and with infiltration trenches.

available development potentials are jointly identified by the local population and stakeholders with the assistance of development professionals. IWM has become a useful planning tool in the hands of local communities as well as professionals from river basin organisations.

C. Annen (2008) shows the successful implementation of IWM measures in Tigray, Ethiopia, where a committed regional government together with their local people started to rehabilitate their war and drought stricken land soon after the end of the civil war in the early nineties of the last century.



Photo: Förch

Ring infiltration basins are also a successful technique in water harvesting.

Comprehensive programmes like the Sustainable Utilisation of Natural Resources for improved Food Security (SUN) Programme (see Box on page 22) supported by German Development Cooperation (GTZ, KfW, ded) have assisted the regional government in developing the natural resource base and establishing new concepts and tools for watershed rehabilitation, water and soil conservation, sustainable land use management, small-scale irrigation, rainwater harvesting, or what ever headings were chosen by various experts and support agencies for doing almost the same: sustainable resource management together with and for the local people. The several hundred year-old experiences of the Konso people in the Southern Ethiopian Rift Valley (Foerch 2002) are being adopted and are supporting further development in other parts of Ethiopia and beyond.

Tremendous efforts can be observed in Tigray, where even drastic decisions have been taken. After establishing terraces and soil bunds almost

all over the region to enable re-vegetation on steep slopes by keeping soils and water the next step is now to implement “zero grazing” all over the region to maintain the vegetation base as long as possible, also into the dry season.

The Tigray example (Annen 2008) shows that comprehensive planning, a strong political will and commitment of the people concerned – the local farmers or rural poor – make the difference when available techniques and concepts for water and soil conservation are implemented under the comprehensive approach of IWM: what is done uphill has its effects downhill, what is done upstream has impacts downstream.

Consequent and comprehensive watershed and gully rehabilitation helps harvest rainwater, improve infiltration and groundwater recharge and enable plant growth. Once dried-up springs start flowing again and provide downstream users with the precious resource water. All kinds of biomass – fresh or used, dried up and detritus, food resi-

due, dung and excreta – are considered valuable and improve manure availability. Tigray is demonstrating a case study of a textbook of soil and water conservation or successful watershed planning. Farmers contribute freely to investments like reshaping of gullies and planting trees with 20 percent of the total cost. Most of them pay in labour, some in cash or kind. Nobody refrains from participating in the endeavour of improving the productivity of their soil and water resources.

This enthusiastic view has been given its scientific proof: Tigray shows growing biomass coverage whereas the other regions in Ethiopia show continuous decline. Munro et. al (2008) as well as Nyssen et. al (2008) have compared available photographs of Tigray covering a span of almost 30 years. The changes are remarkable.

The way forward

Comprehensive planning and implementation on large scale by getting the farmers involved and receiving the benefits of better produce is a key concept. The next step is to start irrigation farming downstream of rehabilitated watersheds in order to stabilise the income base for farmers. Joint resource management by water resource users associations is required for balancing demands with the resources. A newly started project which is supported by the German and Israeli Governments under the Climate Initiative Programme will take up this task.

One sensitive concept is that all users should be required to pay for the water used, especially farmers, or else efficient and sustainable management of water resources cannot be achieved. This “users pay” principle is successful in industrialised countries; however, this poses a problem in developing

Zusammenfassung

In der Nahrungsmittelversorgung der wachsenden Weltbevölkerung werden Wasser und Böden immer mehr zu begrenzenden Ressourcen. Vor allem in den Entwicklungsländern der Tropen sind unbeständige Wetterverhältnisse zusammen mit der meist niedrigen Produktivität der durch Subsistenzwirtschaft geprägten Landwirtschaft eine Gefahr für verletzte ländliche Gesellschaften; der Zugang zu Infrastruktur und natürlichen Ressourcen wird von Tag zu Tag schwieriger. Integrierte Konzepte für ein nachhaltiges und umweltverträgliches Ressourcenmanagement (IWM – Integrated Watershed

Management oder SLM – Sustainable Land Use Management) zeigen jedoch vielversprechende Ergebnisse, wenn sie flächendeckend und über längere Zeiträume umgesetzt werden. Ein Beispiel hierfür findet sich in Tigray, der nördlichsten Region Äthiopiens.

Resumen

El agua y el suelo se están convirtiendo en recursos crecientemente limitantes para hacer frente a las necesidades alimentarias de una población mundial en aumento. En especial en los países en desarrollo tropicales, la variabilidad – en combinación con la productividad a menudo baja

de una agricultura sobre todo de subsistencia – constituye una amenaza para las sociedades rurales vulnerables; el acceso a infraestructura y a recursos naturales asequibles se hace cada día más difícil. Sin embargo, los conceptos integrados para el manejo de los recursos naturales de modo sostenible y ambientalmente compatible (Manejo Integrado de Cuencas Hidrográficas o Manejo Sostenible de la Tierra – IWM y SLM respectivamente por sus siglas en inglés) muestran efectos alentadores si se aplican a gran escala y durante un período prolongado. Éste ha sido el caso en Tigray, la región situada en el extremo norte de Etiopía.

countries, where most farmers are already considered resource-poor and are included among the poorest in society.

IWM concepts play an important role for rural communities to adapt to impacts of climate change. The holistic concept of resource management that refers to a watershed or hydrological defined planning area follows a systematic approach with a major focus on sustainable development

and manifold techniques. Farmers learn to assess the potentials as well as the challenges of their watershed; they work to improve soil moisture as well as groundwater recharge by watershed development measures increasing infiltration – even under increasing climate uncertainties. They reduce over-abstraction of resources and improve resource utilisation efficiency; they bridge the resources gap between the rainy sea-

sons by limited water storage facilities still manageable by local communities and new water saving irrigation techniques. In general, they improve their resilience towards natural disasters resulting from climate change and reduce their dependency on just one income factor. Thus they drastically reduce their vulnerability.

A list of references can be obtained from the author.



Photo: Förch

Gully rehabilitation on degraded land can be successful by planting vetiver grass in combination with bushes and cabbage.