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In Search of Water in Karnataka, India

Degradation of Natural Resources and the Livelihood Crisis in Koppal District

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Water scarcity is a serious problem in Koppal, a semi-arid district with barren rocky hills in northern Karnataka, India. The hills were denuded of forests and trees in the past. Resource depletion continues to occur because of rock blasting and stone cutting. This has led to low groundwater recharge, a problem further aggravated by the digging of bore wells to a depth at which only saline water is available. High-input agriculture combined with saline water has caused the soil to become unproductive. Farmers thus find it more profitable to leave the land uncultivated. As agriculture or other resources in the region do not provide a secure supply of food, people in the area face a severe livelihood crisis. Moreover, the local population and the government do not link the exploitation of rocks and hills to ground water depletion. There is an urgent need for solutions. People respond to their livelihood crisis at the household level and do not come together as a community to address issues. External facilitators are needed to generate a discussion of problems and alternative solutions. Short-term solutions only increase the predicament of the people. Long-term perspectives and investments are required to ensure sustainable management of natural resources as well as livelihoods in this semi-arid area.



Water scarcity in Koppal District

Koppal is a newly established district in northern Karnataka, a state in the south of India. Koppal is semi-arid, with an average annual rainfall of 572 mm spread over 40–50 days, and is situated in the Rayalseema region, which is typically interspersed with plains and mainly barren hills with large rocks (Figure 1). This landscape determines people's livelihood strategies in the region.

Water is scarce in Koppal District. During an Autodidactic Learning for Sustainability (ALS) workshop dealing with natural resource management, conducted in Bikanhalli village in Koppal District, the main issues about which people wanted to learn were related to water. Access to water is a major problem in Koppal District. This includes water needed for drinking, agriculture, and animals. Livelihoods are strained owing to the lack of water and the fact that the water available for agriculture is saline. However, the problem of water is also related to the degradation of other natural resources in the area.

Natural resource degradation and insecure livelihoods

Although water is the primary constraint, all other natural resources in the region are also degraded, leading to insecure livelihoods. Depletion of groundwater has led to digging of increasingly deeper tube wells, to a depth at which only saline water is available. As food crops cannot be grown with saline water, farmers have shifted from food crops to cash crops. But cash crops require more water, so this shift has led to an even greater exploitation of groundwater and salinity in the soil. Over time, food procured from their own land lasts farm households only 4 to 5 months a year. The shift from food crops to cash crops results in a loss of fodder, leading to a reduction in livestock in the area. With less farm work and animal husbandry, people are losing both employment opportunities and income. Consequently, at least

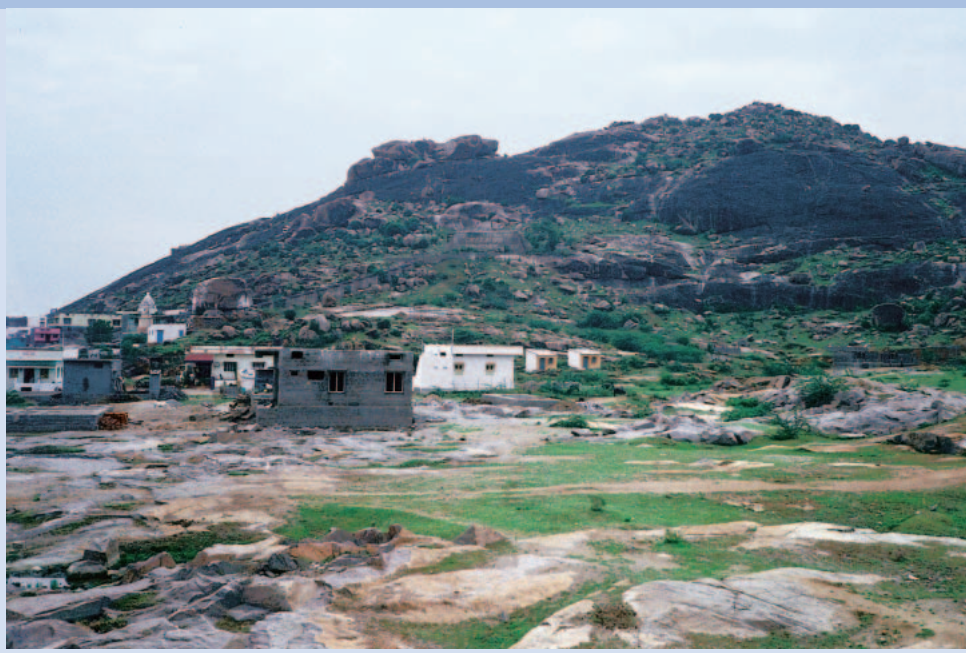
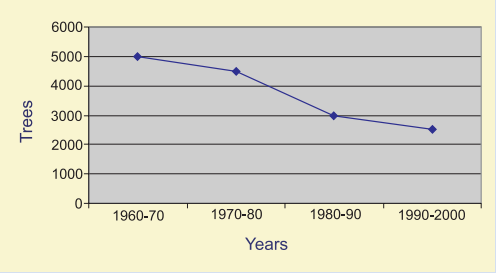


FIGURE 1 Forests used to cover these hills; the land has become barren because of loss of forest cover, loss of hills and ground cover through extraction of rock material, excessive use of groundwater, and salinization. (Photo courtesy of Sampark)

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FIGURE 2 Estimated decrease in the number of trees in Bikanhalli village and surroundings from the 1960s to the late 1990s.



"These hills used to be wooded. There were tigers, here, many years ago. Until 20 years ago bears still existed on these hills. Today, not even 1 tree is left. The hills are barren." (Villager from Koppal)

25–40 residents in each village between 20 and 35 years of age migrate to the seashore to engage in fishing or find work elsewhere as construction and farm labor. They have thus developed a pattern of migrating from their villages for 4–8 months every year.

Degradation of agricultural land

The fields in Koppal District are largely unirrigated, uneven, and stony, and have little protection from rainwater. Much of the land has no bunds or any other arrangement to slow runoff, and most of the fertile topsoil has been eroded by rainwater. The land has become saline and unproductive during the past 20 years; farmers are unable to till it without using chemical fertilizers, pesticides, and hybrid seeds to obtain even an average yield. Irrigated fields also are infertile, for the same reasons, and require even greater investment. Farmers buy expensive tractors to plough their fields because it is harder to plough with traditional equipment. Nevertheless, yields are very low in proportion to the great amount invested. Sometimes the entire crop dries up after use of saline water from the bore well. When farmers get lower yields, they stop growing commercial crops and switch to food grains because these provide fodder for cattle. However, because the soil has already lost its productivity, no combination of crops or trees gives a good yield.

This also affects the health and productivity of animals and people. Animals that do not receive enough fodder provide poor milk and manure. The poor quality and quantity of manure, in turn, affect the health of the crop. This results in poor yields and low incomes, and farmers migrate to earn a better living.



FIGURE 3 Representation of the decline of natural resources over time in a participatory ALS exercise conducted in a village in 1997. (Photo courtesy of Sampark)

Forest depletion

There are very few trees on the land or the hills in Koppal District. Yet the villagers claim that their fathers and forefathers had maintained many trees. In times of drought these trees provided sustenance. But the number of trees has declined over time. For example, the villagers of Bikanhalli stated that there were 5000 trees in and around their village in the 1960s but only 2500 now (Figure 2). This depletion has taken place on private land as well as on common land and in forests. Currently, there are only a few trees from which villagers can collect firewood.

The Forest Department has 2 branches in the district, although it claims that there are no reserve forests in the area. There is no wildlife in the district. Nevertheless, a Forest Department report registers 29,451 hectares of land as forestland. Clearly, forests existed once in the area but have recently become extinct (Figure 3).

Groundwater depletion

Small-scale and large-scale farmers invest their own resources in digging wells and bore wells for irrigation. Many government schemes provide grants and credits to farmers for this purpose. However, this has led to over-exploitation of groundwa-

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FIGURE 4 At times of water shortage, people walk long distances to fetch water in a canal that flows outside the village. Even this scarce supply of water sometimes dries up. (Photo courtesy of Sampark)



ter, especially because adequate measures have not been taken for groundwater recharge.

Villagers state that 50 years ago they had wells only for drinking water. Later, people started digging wells for irrigation. The groundwater level was at about 12 m, gradually decreasing to 18 m. People started digging bore wells about 25 years ago, and the groundwater level dropped to 30 m; today, wells—sometimes 3–4 on the same land—have to be bored to a depth of 45, 60, 75, or even 90 m. When farmers dig bore wells to a depth of over 75 m, they get only salt water, which is not suitable for growing food crops.

This situation has led to a water crisis: there is no more good water in the ground. People are now completely dependent on tap water because their local sources have already been depleted. The 2002 monsoon did not bring adequate rain, so all water sources have become dry. Although people switched to consuming drinking water from open tanks and bunds, even these dried up by mid-August 2002. The local *gram Panchayat* (municipality) has provided vehicles and plastic tanks to the village, but they are able to supply water only once in 4 or 5 days. The villagers have made arrangements to bring water from far-off places and distribute it on a limited basis, that is, 1 bucket for each person and each animal in the household. However, this is not adequate to meet their needs. Consequently, women, men, and children are forced to walk long distances daily to fetch water. The scarcity of a resource so critical to survival has led to unsustainable livelihoods (Figure 4).

Depletion of hills and rocks

Stonecutting is common in Koppal. There are 18 government-licensed quarry industries for pulverizing stone and several small unlicensed industries. Each engages about 10–15 laborers full-time. There are about 16 contractors and subcontractors who buy the stones from stonecutters. The contractors and stonecutters earn little money from this operation because most of the profits go to pulverizing units and contractors in urban areas. The government has plans to invest 1 million rupees to set up a stonecutting and polishing unit with a capacity of 3250 m^2 and employing 10 people. Stonecutters depend on this work for survival. They claim that they survive by stonecutting when agriculture fails or seasonal employment is over.

Stonecutters do not believe that any serious degradation is taking place (Figure 5). They believe that the rocks cannot be removed fully, and that they will last for another 10 generations. Although this is likely if only manual labor is used, stone quarrying also is done through blasting and machines. This accelerates depletion, and hills are becoming plains. Research has shown that water tables are not flat. They mimic the topography in a subdued way. Moreover, groundwater movement depends on the porosity and permeability of the rock. If rocks are blasted and taken away, the infiltration of water is affected negatively, because more evaporation will take place from the surface.

In the past, Koppal had rich resources, including water, soil, hills, forests, and good agriculture. Indeed some of the very old houses, temples, and forts in the villages show evidence of this. The forts were situated on top of hills and had lakes which provided a reservoir for human habitation. Many dry channels pass through the district, where rainwater

"I have spent my entire lifetime in search of water. In search of water, my hair has become white." (Rudrappa, a farmer from Bikanhalli)

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FIGURE 5 Stones being prepared for use in construction. This valuable source of income unfortunately leads to depletion of the very resource on which it relies; excessive stonecutting also degrades the environment, causing erosion and loss of topsoil. (Photo courtesy of Sampark)



"Where you stand now, a hill stood many years ago, now we till around these rocks and grow some crops." (Villager from Koppal)

flowed many years ago. Recent articles in the *Deccan Herald* have highlighted the fact that thick forests with diverse wildlife once existed around Koppal town. The people in the villages, the industrialists, and the government do not see the link between degradation of different natural resources. They do not connect highland and lowland issues, nor do they see the cutting of rocks as having a negative impact on groundwater recharge.

A livelihood crisis

The cycle of natural resource degradation over a long period of time has led to a livelihood crisis for the people of Koppal. This is elaborated in Figure 6. Most people do not see the overall problem because they have not yet realized the links between different natural resources. They tend to be aware only of the present state of resources. Most have not analyzed the reasons for resource degradation during the past 10 or 20 years. People do not think of natural resources as community assets, nor do they come together as a community to discuss the state of these resources or plan their conservation. Livelihood choices are made on a household basis, and individual concerns are rarely shared. Most villagers accept the degraded state of natural resources as inevitable, eventually choosing alternatives with very high social and financial costs.

The search for (long-term) solutions

It is difficult to take an integrated view of the state and management of all natural resources, forests, hills, land, and water. External intervention by a nongovernmental organization (NGO) or the government is necessary to begin an informed dialogue on these issues at the community level.

This is a difficult task. Having different categories of people represented on a community-level platform takes time and effort and requires good relationships. Only NGOs that have invested time in building good relationships with people are able to generate high-quality discussion at the community level. Much investment in time and people is required to understand the complex interactions between use of resources and livelihoods. It is even more difficult to generate alternative solutions. The problems relating to the quantity and quality of water required to sustain livelihoods have become grave and insoluble. There are no short-term solutions.

Highland and lowland management must be viewed in an integrated manner, and solutions must have an integrated, long-term perspective. There is a need to halt overexploitation of natural resources

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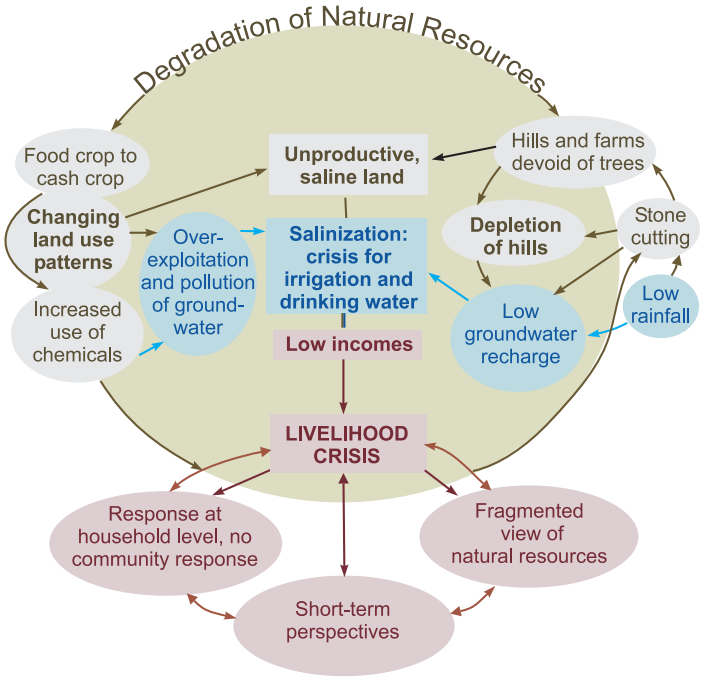


FIGURE 6 The vicious cycle of natural resource degradation that has led to a major livelihood crisis for the people of Koppal.

immediately, although these are the resources—hills, stones, trees, land, and water—on which rural people depend for income. They will need livelihood support if natural resources have to be conserved and restored. Groundwater levels can be increased only if cutting rocks and digging bore wells is stopped completely. This cannot be done without affecting the livelihoods of farmers and stonecutters.

It is clear that these problems have developed over a long period of time. Long-term perspectives and long-term investments are required to initiate a move toward solutions. Long-term sustainability of natural resources, especially critical resources such as water, is closely linked with management of other natural resources and determines the sustainability of livelihoods of the rural population in these areas.

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