

Case Study Sample: Water Management

Two decades ago, natives of villages in Rajasthan, India, were facing overwhelming poverty (up to 80% of people in poverty!) due to several years of severe droughts. The lack of rainfall led to soil erosion, low production of crops, dried-up rivers, and people having to dig further and further underground to reach water. Also, as a result of over-grazing by livestock, and wide-spread cutting of trees by villagers, the land was becoming more desert-like, and the soil was less able to hold onto enough water to provide the villages with enough ground water. Most of the water that was available was now too salty either for drinking or for using to irrigate crops. With such difficult conditions for supporting their families, village men were forced to leave their homes to find work in urban centers (cities).

At the time, India's water management policies, backed by international financial institutions, were focused on building huge dams that would gather water to be distributed for irrigation of agricultural areas across large areas. These policies, however, were not helping the villagers of Rajasthan. A fresh approach to water management came about when a youth organization, Tarun Bharat Singh, joined forces with the villagers to bring back traditional methods of collecting and protecting water. With the goal of providing more water for drinking and irrigation, and increasing the groundwater, they turned their focus away from indirect sources of water, such as lakes and rivers, and towards the first source of water: rain.

Harvesting rain, or catching and storing rain by and for the community, had been developed for thousands of years, but began falling apart when India began planning water management through massive dams on a nation-wide level. Now the youth group and community members worked on restoring methods of catching rain and beginning a program of reforestation, by planting tree-saplings and creating sanctuaries, so that the soil would be protected and ground water would increase. They understood that in order to have adequate water, they also needed healthy soil and forests.

There were three main methods they used to harvest the rain, all of which had been carefully created over the millenia to meet the conditions of the local environment. First, is different types of wells that are created to capture water rather than to find the water deep beneath the ground. Some of these wells capture water that flows from rooftops, some are groups of wells with large, saucer-like openings used to funnel rain falling in a larger area, and some are wells that force the rain to flow through sandy soil as a filter. Second are small dams made out of dirt, that trap the rainwater for immediate use, and also seeps into the ground to improve the ground water. Since the program began, over 3000 of these small dams have been built in more than 650 villages. The third method is using reservoirs. Some of these are natural ponds and others are man-made. In some places stone walls are built stretching all the way between two hills to act as a reservoir tank. These reservoirs collect water, and when they dry up they are used to grow rice.

As this project has unfolded there have been many results, some of which were surprises. There was a return of the water supplies and agricultural production to levels that could support the communities. Five rivers that had only been running during the rainy season were fully revived, and started running all year long. The departure of men for the cities stopped, and in some cases, the men started returning to the village. Animals, including tigers, returned to the forests wildlife sanctuaries. Community members realized they had the power to do something, and began setting into place other programs, such as literacy and education for girls and women. Finally, because the project was so successful, it became used as a model to set up similar programs in many other areas struggling with water.

Key Concepts:

- **Drought:** a very long period without rain
- **Soil erosion:** when the soil is worn away

- **Irrigation:** a man-made system for watering land
- **Ground water:** water in the ground used for wells, springs, and to water crops
- **Harvest:** to gather

Questions for the Case Study Sample

1. Where is the case study from (country and continent)?
2. What were the problems faced by the community?
3. How are the causes and effects of these problems related to the interaction between humans and their environment?
4. What specific natural resources are at stake?
5. Who is trying to solve the problem?
6. How do they try to solve the problem? Be specific about the steps that have been taken.
7. What are the concrete benefits of their actions for people and their environment?
8. Why does this approach move the community towards a sustainable life?

Case Study #1: The Honge Tree

In the semi-arid state of Karnataka, India, villagers had struggled with poor harvests even though there was great agricultural potential. There is a good supply of ground water for the crops, but it is very deep underground. Fuel was needed to work pumps that could bring the water to the surface, and this was simply too expensive for farmers. The water was there, but there was no way to get it.

At the time there was a local organization called SuTRA (Suitable Transformations of Rural Areas) working on development in 8 local villages on projects such as rain harvesting, energy, and drying vegetables. The organization hit upon the idea to use the oil from the seeds of the native Honge tree (pronounced 'hongee') as fuel to power well pumps and for other domestic uses. The oil from the seed of the honge tree, commonly known as the Indian beech, has been used by villagers for many purposes, such as soap, cosmetics, insecticide, lubricant, medicinal/healing remedies. The tree itself was also used by farmer to grow as hedge around farmland to break the wind. But it was never used for fuel!

This tree, which had so many good uses, was a particularly easy one to grow because it has very long roots which reach far underground for water. This means that they can grow on very poor land and can survive during droughts, allowing farmers to make use of even their worst land. Also, their roots improve the quality of the soil, which gives farmers another good reason to grow it alongside their other crops. The trees take only four to five years after planting to produce seeds, at which time the villagers collect the seeds, dry them in the sun, and take them to the oil mill to sell to the power station. The oil is then used as an affordable fuel for the well pumps, so that the ground water can be used for their crops.

There have been many results from the use of the honge tree. Farmers are now assured a supply of water and, therefore, food. They are able to support themselves and secure their food and water needs with very little cost and effort, and without relying on outside sources. Surplus (extra) energy from the water pumps is sold to the villages for lighting and other energy needs. Villagers have a new source of income. Environmental impacts are much lower than the fuel supplies that were used before then, such as diesel fuel. This project is being used as a model to start similar projects in five other villages. As an experiment, five city buses in the state capital are running on the honge oil, and scientists are predicting that the honge oil will become a significant energy source in India. Because it can be planted either in wastelands or mixed in with crops, some scientists say it has the potential of reducing India's oil imports by a third.

Key Concepts:

- **Ground water:** water in the ground used for wells, springs, and to water crops.

Questions for Case Study #1

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Case Study #2: Forest Management

The Qiang people live in the Sichuan province of China. This area is important for its mountain forests, which are a major source of water for the Yangtze river which runs through China. Deforestation and population growth over four decades have caused the forests to shrink by up to 40%. The loss of so much forest has also meant that many species of plants and animals (biodiversity) has been lost.

By the 1980's so much of the forest had disappeared that the Government realized that something had to be done, and funded a reforestation program. However, before the government set up a specific program of action, it sent teams of scientists to the villages to figure out how they could work together. The government knew that if the villagers didn't believe in their program, and know how it could benefit them, then there was no chance of success.

They decided that they would need to rely on the native knowledge of the Qiang people to help decide what to plant and how to plant it, and incorporate their methods of forest management. It turned out that collection of plants for herbal medicines was a major source of income for the Qiang people. The government decided to blend the cultivation of these plants with the project of reforestation. This guaranteed that the farmers would participate. The final solution was to plant trees in terraces, or strips. Horizontal bands of original vegetation, the native plants collected for medicines, were alternated with bands of tree seedlings.

This system of alternating bands protected the soil from erosion and water runoff, brought the forest back to life, and increased the diversity of species in the forests. Because wooded areas were being opened up for cultivation by locals, they no longer had to go into the areas of protected forest to grow and collect medicinal plants. This means that protected areas will actually remain protected. It has allowed for the replanting and restoration of forest. The terraces have also created the ideal conditions for cultivating medicinal plants, so that the income and standard of living of villagers has gone up. The project has also given a higher status to medicinal knowledge, which will help ensure that the knowledge is passed down to future generations.

In the past attempts at reforestation in China had involved banning locals from entering the forests. If the government had done this, the project would not have been sustainable, because Qiang people traditionally cultivate medicinal plants in surrounding woodland and around their homes, and they were not about to change their way of life and means of supporting themselves. This project focused not only on replanting trees, but on opening up woodlands to locals, so that they could cultivate under the tree canopy as they had always done.

Key Concepts:

- **Deforestation:** The destruction of forests
- **Reforestation:** The replanting and protection of forests

Questions for Case Study #2

1. Where is your case study from (country and continent)?
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Case Study #3: Energy Management

Freiburg is a 900 year-old city in Germany, with a population of more than 200,000. In the 1970's the government planned to build a nuclear power plant 20 miles from the city. Residents were extremely worried about the danger of nuclear power spills, toxic waste, and impact on the health of their community. A large part of the city protested and resisted, and as a result they were able to stop the plan. They did not stop there, though. The city made a connection between energy consumption and nuclear power, and they decided to start looking for alternatives.

The city has five major areas it has concentrated on:

Traffic planning: They decided to reduce dependence on cars without reducing the ability of people and businesses to get around. An affordable local transportation system (streetcars and buses) was created. The system connects not only different parts of the city, but connects the city with administrative districts stretching over a 35 mile area. Almost 300 miles of bike paths were created to promote cycling. Now, a third of the journeys taken in the city are done by bicycle. This has significantly reduced both air pollution and dependence on energy.

Energy/Climate protection: Regulations were created that all new houses have to meet low energy housing standards, by making use of solar energy simply by the design and position of the windows. The houses are 3% more expensive but energy costs are reduced by 30%, so money is saved in the longer term. For active solar energy, the government provides financial help for individuals to get set up with solar panels. They believe they must provide financial help to create a large enough demand for solar panels for companies to be able to eventually lower the cost of making and buying these panels.

Waste disposal: Each household has four bins for sorting waste, one of which is a 'bio-bin' for all of the organic waste from the kitchen. This kitchen waste is taken to the composting center at the waste disposal plant, where it is processed and turned into methane gas. The gas produced by this waste provides electricity and heat for 10,000 people and has far lower emissions than other forms of fuel. Overall, Freiburg is able to produce 50% of its own energy, and garbage was reduced from 140,000 tons to 50,000 tons in less than 15 years.

Key Concepts:

- **Compost:** organic materials mixed together to decay

Questions for Case Study #3

1. Where is your case study from (country and continent)?
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Case Study #4: Urban Planning

In the 1950's, the population of Curitiba, Brazil, was 150,000. Today it is a major city of nearly 1.6 million. In the 1960's, a group of young architects, knowing the city was on the verge of explosive growth, wanted to see something different happen than what had unfolded in other growing Latin American cities. In other major cities, costly structures such as skyscrapers, highways, and shopping malls had driven cities into debt, had a disastrous effect on the environment, and had greatly reduced the quality of life community members had in a small city. The mayor was open to their ideas, and sponsored an urban planning contest for a Master Plan of the city. The plan was supposed to provide economic support for a growing city by creating industrial zones. It was also supposed to help the city be independent, by providing enough education, health care, recreation and park areas. Once a plan was chosen it was debated in the community, so that people could give input to the architects.

The plan that was chosen, and put into action, put transportation in the spotlight. The designers believed that you could not separate managing traffic and managing how land will be used. They focused on creating a very efficient bus system that looks like a spider-web. Five major routes leaving from the city center and moving directly outward, and all of these are criss-crossed by circles moving outward from the center! There are different types of buses, local and express, and the express buses can carry up to 300 passengers. Each bus station is carefully designed for efficiency and comfort. The station is shaped like a tube, where people pay to enter at one end and exit at the other end, so that no one has to wait in line for the bus, everyone is protected from weather conditions, and there is easy access for disabled people. As a result, the building of new housing has naturally happened near bus lines, and the use of gasoline is low compared to other cities in Brazil.

The plan also included ways to make sure that natural spaces were a basic part of the city. Approximately 1.5 million tree seedlings were given to neighborhood people to plant and care for, so that the city would be full of trees. The city had always had problems with flood, so the architects created 17 new parks and then diverted the water from the lowlands into these park to form lakes. Teenagers were hired to keep the parks and their bike-paths clean.

Another feature of the plan was to turn the downtown shopping area into a pedestrian only area. At first some shopkeepers were against this idea, but they were willing to try a 30-day trial. The trial was so successful for businesses that shopkeepers outside the district asked to be included. Some of these streets are lined with gardens that are tended by children. This is part of a program set up with shops and other institutions to adopt a few orphaned or abandoned kids (a major problem in Brazil's urban centers) to give them a daily meal and small wage in exchange for simple gardening, cleaning, or office work.

A final part of the plan is recycling and waste management. In people's homes and businesses, waste is separated into two categories, organic and inorganic. There are also neighborhood centers where homeless people can bring bags of trash in exchange for bus tickets or food. Waste goes to a plant that employs new immigrants, disabled or other disadvantaged people to separate materials for recycling. For example, styrofoam is shredded and used to stuff quilts for poor residents. The programs costs the same amount as a landfill but keeps the city cleaner, provides more jobs, supports farmers, and is environmentally responsible by recycling two-thirds of its garbage: one of the highest rates in the world. The city is so serious about recycling, that they even reuse buildings, by turning abandoned warehouses and factories into theatres and community centers!

Key Concepts:

- **Urban planning:** deciding the future physical setup of a city

Questions for Case Study #4

1. Where is your case study from (country and continent)?
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Case Study #5: Water Management

The Europeans who colonized and settled South Africa brought many types of trees from the Americas, Asia, Europe, and Australia to create an industry based on forest products. Before these trees--such as the American Pine--were introduced, the landscape was covered by native shrubs which used very little water. The new trees were very invasive, and took over almost 8% of the South African landscape, causing the disappearance of many native plants, reducing the biodiversity (many types of plants and animals), and, most disastrously, using up 9% of the nation's water. These trees were drying up major watersheds in a way native plants would not, which destroyed the soil and left little water for drinking and agriculture. These trees were also spreading dangerous forest fires, since many of the invasive trees burned with ten times the heat of the native shrubs.

In 1995, after black Africans regained control of South Africa, a program was set up to solve the hardships created by poor water management. Normally it would go against common sense to bring back a watershed by cutting down forests, but since these forests consumed huge amounts of water compared to native plants, this was the best path. The government decided it would be less expensive to clear hillsides and riverbanks of the invasive species, allowing native species to come back, than to build new dams. The government employed 21,000 people to begin cutting down and recycling the invasive forests. They went to great length to give these new jobs to people with fewer opportunities, such as disabled people, ex-prisoners, youth, those with HIV/AIDS, with more than half of the employees being female.

The project accomplished a wide range of changes, combining environmental and social justice. South Africa was able to control the invasive species without doing more damage to the land. Fires could now be controlled more easily, and areas destroyed by fire could be restored. Small businesses were set up to use the cleared wood, making goods such as crafts, furniture, charcoal, and smoke-chips. Training programs were set up to teach people how to design and market these products, and how to run a business. Education about HIV/AIDS (a very serious problem in South Africa), family planning, and other health issues could be provided to workers.

Key Concepts:

- **Watershed:** the area that drains water into rivers and streams

Questions for Case Study #5

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Case Study #6: Toxic Waste Removal

In a neighborhood of East Austin, Texas, a 52-acre 'Tank Farm' or fuel storage facility, owned by major oil companies, had released toxic wastes into the surrounding community for thirty-five years. The chemical waste was linked to chronic illnesses suffered in the neighborhoods, which were 88% Latino or African-American. A community group called PODER (People Organized in the Defense of Earth and her Resources) organized to overcome what they considered a case of environmental injustice. They saw it as injustice because the decisions and zoning for land use created a situation where the environmental hardships were felt in the parts of town where poor and disadvantaged people lived while the people in the wealthier parts of town were enjoying the benefits without having their neighborhoods experience any of the hardships.

PODER started a campaign to have the toxic Tank Farm Facility removed from the community. After working for a year with other community groups and residents, they were successful in getting the storage facility closed and relocated. The campaign over the Tank Farm did not stop with the closure. Pressure was also put on the government to force the oil companies to clean the closed storage tank sites. The groups also forced the city to change the zoning of the Tank Farm site from 'industrial' to 'community/neighborhood/business' so that no new industrial level business could move in. They also got a law passed that required the city to inform neighborhood residents when an industrial facility wants to locate or expand in their area, so that residents would have a chance to voice their opinion. They also forced the city council to begin a study on how land is used in East Austin, so that environmental injustice could be prevented. Finally, to help communities affected by toxic wastes in other states, they shared the survey they had used to figure out the specific health problems of residents near the Tank Farm.

The community organizing to address the Tank Farm problems was so successful, that community members felt more able to take on a wide range of issues by setting up new programs and campaigns. Some of the campaigns they began worked on cleaning up poorly-run, rat-infested recycling facilities, reforming public transportation, and giving computer training to community members to narrow the 'digital divide' and help their residents succeed.

Key Concepts:

- **Toxic Waste:** The poisonous leftovers of industrial production

Questions for Case Study #6

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Case Study #7: Ocean Preserves

In much of the South Pacific the coral reefs have been dying, taking with them all of the plants and animals that depend on the reefs for shelter and nutrition. The people in these coastal areas also depend on fishing for their survival. As the coral reefs have died, people have also found it increasingly difficult to support their communities and have found themselves taking more and more drastic measures to catch fish. Various factors have contributed to the slow death of coral reefs, but it all comes down to overfishing. Some of the destructive techniques used in overfishing were reef blasting, reef bombing, gill nets, and allowing access to foreign fishing fleets.

Reef Blasting is when hand-made bombs are thrown into reefs to stun all fish in the area, so that fishermen can gather the fish by hand. The bombs, however, kill many species, including larvae and juveniles. They also shatter coral reefs. When the coral heads are destroyed, fish lose their shelter, and cannot stay in the area. In the end, this means less fish. Reef Bombing is quite different. It is also called poison fishing, because a poison--usually cyanide--is squirted into the coral reefs to stun fish and make them easy to capture. Poison fishing is used to catch speciality fish that will end up in pet store fish tanks or in restaurant fish tanks in countries that value live fish. The cyanide not only causes the slow death of the captured fish, but also slowly kills coral colonies and other organisms. Gill nets, also called drift nets, are huge nets that float around and capture huge amounts of fish and other sea animals. It is very wasteful, since many 'unwanted' creatures are caught and killed, including large amounts of dolphins, seals, turtles, seabirds, and even whales. All of these over-fishing techniques were used not only by locals but by large foreign fishing fleets.

Below are two nations that set up programs to bring back their reefs, their fish, and their livelihood.

A. In Veratavou, Fiji, villagers faced the decline of their fisheries, especially the loss of the kaikoso, a species of clam important to both their incomes and daily meals. The villagers and a local organization got together to find solutions to their dramatic loss of fish. They created a list of rules: they banned blasting, gill nets, stopped issuing licenses to foreign fishers, and created 'tabu', protected reserves in certain areas of the lagoon.

Results were immediate and dramatic. The reef started to come back to life, and the kaikoso increased up to three times in the protected areas, and this spilled over to the non-protected areas so that their numbers were increased everywhere. Other species that had entirely vanished suddenly reappeared. The fishing became so much better that residents' income went up by 35%, and some of this money was put into a group fund to invest in setting up electricity in more areas.

B. On Raratonga Island in the Cook Islands, fishermen were having to go out further to chase fewer and fewer fish. Their main staple and source of income was the trochus shellfish, whose supply was dropping steadily. The elders of Raratonga decided to bring back the traditional 'no-take' system known as rau. They set up temporary reserves which were set up or lifted depending on the season, harvests, and other conditions that had been learned over many years. Bans on all net fishing were set up.

The results were also dramatic in Raratonga. The trochus populations exploded, many species came back to life, and the coral reefs have increased. People's food and income greatly improved, and the community has been using some of this money to develop educational programs.

Key Concepts:

- **Overfishing:** destroying the fish supply

Questions for Case Study #7

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Environmental Conference Notes:

Case Study #1:

Country & Continent:

Key Concepts:

What crisis is faced?

What is done to solve the crisis?

How does the solution benefit people and their environment?

Case Study #2:

Country & Continent:

Key Concepts:

What crisis is faced?

What is done to solve the crisis?

How does the solution benefit people and their environment?

Case Study #3:

Country & Continent:

Key Concepts:

What crisis is faced?

What is done to solve the crisis?

How does the solution benefit people and their environment?

Case Study #4

Country & Continent:

Key Concepts:

What crisis is faced?

What is done to solve the crisis?

How does the solution benefit people and their environment?

Case Study #5:

Country & Continent:

Key Concepts:

What crisis is faced?

What is done to solve the crisis?

How does the solution benefit people and their environment?

Case Study #6:

Country & Continent:

Key Concepts:

What crisis is faced?

What is done to solve the crisis?

How does the solution benefit people and their environment?

Case Study #7:

Country & Continent:

Key Concepts:

What crisis is faced?

What is done to solve the crisis?

How does the solution benefit people and their environment?

Environmental Conference Results:

Your conference only has enough funding to help replicate (copy in other places) one project.

What project should it be?

Your own top 2 choices:

Top choice of the conference: