THE HYDROGRAMEEN MODEL

Water that Works for Everybody

A New Kind of Community. A HydroGrameen is a watershed management community which serves to provide the benefits of clean water, housing, nourishment, education, access to health care, a decent wage, and membership in a supportive community in exchange for a willingness to work within the HydroGrameen community or on the common land. Membership is free for the poor; the only repayment expected is that members flourish.

An Investment in Better Lives. The HydroGrameen is an investment in better lives. We believe that the possibilities of fairness begin with opportunity, and that the best mechanism for social and economic growth is providing the poor with the means of self-improvement. If our development practices continue to destroy the lives and livelihoods of our less fortunate citizens under failed promises of prosperity, economies will not thrive and democracies will not survive. We believe that, within a proper framework, the provision of land and education, combined with the transfer of technical knowledge and wherewithal, will have large payoffs for local economies. But more importantly, these benefits will emerge from the increased health and happiness of the population.

Water Knows no Boundaries. When we seek to impose them financially, through privatization, we limit our own humanity. Water is life, it is the fundamental truth of the human body, and we must not monetize water's equity against the lives and livelihoods of the poor. Development practices should promote the financial wellbeing of the community, and, like the medical profession, they should do no harm. We think of the HydroGrameen as a new form of ecological community. For those without financial resources, membership in a HydroGrameen cooperative begins with an interest free loan. The cooperative seeks no profits for itself, but returns its gains to the community and distributes them among the people. In exchange for sweat equity, the HydroGrameen returns to its members both human equity and equity in the form of food, livelihoods, vocational training, if necessary, a wage, a home, and services including healthcare, education, and village maintenance. The loans made by HydroGrameens are opportunities for better lives, and in return for these loans, HydroGrameens expect that their members will take such opportunities and make them work for themselves, their families, community, and nation, and for the overall benefit of a planet beset by a water crisis unprecedented in human history.

A Water Bank. We must think globally and act locally, yet acting locally can have global consequences. Like seeds, water is a precious resource that requires new models for conservation, and HydroGrameens are water banks that follow the model of seed banks. As with the seeds upon which human life ultimately depends, water must be counted among our most precious resources, a necessity of life which must be possessed in common, and a form of sustenance that must be shared before it can be sold or traded. The HydroGrameen is a water bank that allows us to recharge depleted aquifers and conserve this resource for the future. In this model, participants invest their efforts in the care and preservation of our water resources, and, in exchange, receive better lives and livelihoods. In return for the opportunity to work on the land and in the villages, economies will grow from the ground up. We can do more to achieve social and economic goals when we regard the basic requisites of human equity as investments in human and ecological capital.

BERKELEY · KOLKATA · DHAKA · LEEDS

About the IIBHB

The International Institute of Bengal and Himalayan Basins (IIBHB) is a nonprofit organization headquartered in Berkeley, California, and registered in the United States and India. We work on environmental and ecological issues in California, the Bengal and Himalayan Basins, and in other locations around the world. The IIBHB also supports educational, health, housing, women's and human rights in the Bengal Basin as well as in other areas where its services are needed.

The IIBHB was cofounded by Dr. Rash B. Ghosh, a Bengali-American scientist, our president, Dr. Derek Whitworth, and Professors Glenn T. Seaborg and Charles H. Townes. Professor Seaborg was the 1951 Nobel Laureate in Chemistry and discoverer of Plutonium, and Professor Townes, the inventor of laser technology, the 1964 Nobel Laureate in Physics, as well as the 1999 and 2005 recipient of the Tagore and Templeton awards.

The IIBHB has attracted a wide range of experts in many fields who are ready to assist in the search for solutions to the various water problems that exist throughout the Bengal and Himalayan Basins and the rest of the world. Among the prominent scientists and scholars currently associated with the IIBHB is Randy Schekman, the 2013 Nobel Laureate in Medicine, and Professor Richard Saykally of the UCB Chemistry Department. The IIBHB has local chapters in England, Bangladesh, and India.

Our mission is to operate globally using our experience in South Asia and California to create working models that address the water crises in emerging as well as developed economies. The Himalayan and Bengal Basins and their vast catchment areas are home to one of our planet's most important fresh water resources. This region includes vastly different hydrologies, geologies, and ecosystems, and it spans elevations ranging from the world's highest peaks to one of the lowest lands on earth. The extreme differences in elevation, geography, and ecology make this region exceptionally valuable for developing water management and remediation technologies for the rest of the planet.

The IIBHB offers pro bono environmental consulting services to industries, landowners, and citizens in the US, on the Indo-Bangla Subcontinent, and elsewhere. Two-hour sessions are available with additional hours for those working for the benefit of the community, including nonprofit and political organizations. Confidentiality is assured. Contact us by email: info@iibhb.org.

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PEACE

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Conceptualized and designed by John Paulin, PhD. *2016/09/15*

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The International Institute
of the Bengal and Himalayan Basins

IIBHB.ORG

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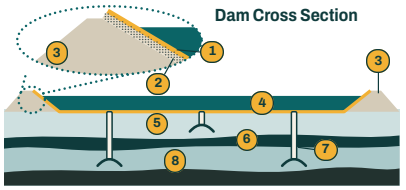
The Global Water Crisis. Over the next hundred years, sources of water fit for human consumption, including surface waters, shallow and deep aquifers, and glaciers will face increasing threats of depletion and contamination as a result of climate change, deforestation, desertification, population growth, sea-level rise, and unwise industrial, agricultural, and development practices. In fact, what we call the "water crisis" is a particular way of looking at a larger systematic and comprehensive environmental crisis now manifest across our planet in the forms just enumerated. Ideally, solutions to any of these problems should be multifaceted, aimed at remedies that tackle a number of our Earth's most urgent problems holistically. Providing environmentally friendly housing, agriculture, and water resources for an increasing population while teaching sustainability. Given the magnitude of the complex and burgeoning crises, comprehensive solutions are an investment in our future and the health and continuity of our ecosystem. Remedies are necessary. Our contribution is what we call the "HydroGrameen" model, a design for a complex of villages built around a central reservoir on the principles of sustainable hydrological, architectural, and agricultural development, which addresses the challenges of sea-level rise. While serving its communities economically and as a source of clean drinking water, irrigation, and aquaculture, HydroGrameen projects will, in turn, be used to recharge or cleanse deep and shallow aquifers and will also prevent land subsidence.

The HydroGrameen. The term "HydroGrameen" is a combination of the Greek prefix, "*hydro*," which means "water" and "*gram*," the Bengali word for village. A HydroGrameen is a watershed management cooperative consisting of a complex of villages built around a reservoir, which has been constructed to recharge aquifers, to mitigate toxic pollution, and to provide sustainable, self-financing, and economically independent homes and communities for the poor and for those who are willing to contribute expertise or otherwise willing to support the cooperative.

Reservoirs. Reservoirs (max 3 sq. mi.) will be built within 26.5 degree embankment dams covered with stones, and sealed with sheeting made from a durable, inert, impervious material such as Tyvek, which will protect the reservoir from contaminants in the local soils and shallow aquifers. The reservoir will be fed by rivers and rains, and injection tubes will permit rapid percolation for efficient recharging and cleansing of depleted and contaminated shallow and production aquifers. Hydrologically sensitive areas surrounding the HydroGrameen will be left undeveloped to protect aquifers and support percolation. Existing water bodies can also be adapted serve as reservoirs. One requirement for construction of a HydroGrameen project is that it be sited on land that is secure for 100 years against flooding and sea-level rise. Construction of HydroGrameens in coastal regions will also include the planting of mangrove forests around cooperatives to prevent soil erosion.

"We must think globally and act locally, yet acting locally can have global consequences."

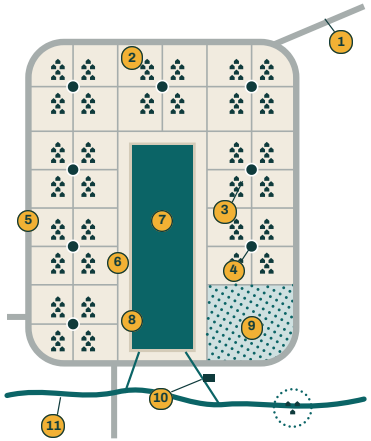
HYDROLOGY



1. Impervious Sheet
2. Stone layer
3. Embankment Dam
4. Reservoir
5. Shallow Aquifer
6. Impervious Stratum
7. Injection Tube
8. Confined Aquifer

HYDROGRAMEEN COOPERATIVE

3 Sq. Mi. Reservoir (maximum size)



1. To Highway
2. Commons
3. Village
4. Village Center
5. Ring Connector
6. Access Road
7. Reservoir
8. Embankment Dam
9. Hydrologically Sensitive Area
10. Pump Station
11. River

STARTER VILLAGE



- Subsidized Housing
- Unsubsidized Housing

HYDROGRAMEEN CONSTRUCTION PROTOCOLS

- HydroGrameen sites will be built to superfund standards, or, where not applicable, to local standards or better.
- CERCLIS (Comprehensive Environmental Response, Compensation and Liability Information System) and RCRA (Resource Conservation and Recovery Act) Standards will be applied where applicable.
- Risk Assessment.
- EPA site cleanup process will be followed for all sites. Mitre model will be used for ranking.
- Point and nonpoint sources will be evaluated during the selection of HydroGrameen sites.
- HydroGrameen site selection will largely depend on water yielding areas.

The Starter Village. The HydroGrameen Complex will begin with a starter village that will serve as a model for the development of additional villages around the reservoir.

Villages. A complex of sustainable, environmentally sound villages removed at least 100 meters from the reservoir and surrounded by communal areas for public facilities, including schools, houses of worship, communal and family agriculture, administrative buildings, playing fields, sports facilities, private enterprise, etc. Preferred building materials will include inexpensive, readily available, environmentally friendly, recyclable, and renewable resources. For example, bamboo can be grown on site and provides the additional benefit of carbon sequestration against climate change.

Subsidized housing will accommodate the poor and the landless. However, an additional preference exists for civil and environmental engineers, teachers, medical, community health, and human rights professionals and others willing to work within the cooperative.

Unsubsidized housing pays for village and reservoir maintenance, community facilities, fisheries, agricultural assistance for villagers. No more than 2 units of unsubsidized housing may be purchased per family within any given HydroGrameen Cooperative Complex. Unsubsidized housing residents will have the same rights, responsibilities, and membership obligations as other cooperative residents. 20% of profit from property sales will be invested in technical training of villagers. First priority will be the children of the poor, who will receive a solid educational background that will either prepare them for higher education or, vocationally, for specialized trades within the cooperative.

Communal Areas. The *village centers* will contain facilities for civic and communal activities to be shared among four adjacent villages. Schools, administrative buildings, clinics and hospitals will be situated here, as well as private enterprises through leasing and rental agreements. The *commons* situated outside the villages are for playing fields, light recreational use, and family and cooperative agricultural ventures. The commons may contain communal cow sheds and other shared facilities.

Economy. The reservoir itself will contribute to the local economy by providing water for irrigation and fisheries. Among the economic benefits that the HydroGrameen will offer to underdeveloped areas is the introduction of a service economy, which will offer stability against the seasonal fluctuations and other vulnerabilities of a solely agricultural economy. Additionally, real estate values in the vicinity of the reservoirs can be expected to rise and will create a demand for unsubsidized housing as the land becomes more developed. The HydroGrameen administration will promote the community economy by encouraging the development of cooperative and private, entrepreneurial enterprises within the communal areas. All residents of the HydroGrameen will have access to the resources of the communal areas which will include plots for individual and cooperative farming and commons for grazing livestock.

Public Education. A commitment to accepting free public education of all children, girls as well as boys, is a requirement for joining the cooperative.

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