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THE COMING STORM

PREPARING FOR A WARMING WATER WORLD

Even under the most optimistic scenario for cutting greenhouse gas pollution, the world will likely warm substantially in coming decades. This will cause major disruptions to the patterns of rain and snow that societies and ecosystems have evolved under. We are already experiencing worsening droughts and floods and fast-receding glaciers, and there can be little doubt that much worse is on the way.

The water systems we are planning and building now need to be safe and effective under the unpredictable hydrological conditions we will be experiencing several decades into the future. Existing systems also need to be reevaluated in the light of climate change to ensure that they can cope with new extremes of rain and drought.

Adaptation strategies should be based on three key principles: increasing the climate resilience of the poor; prioritizing flexible, cost-effective approaches; and mitigating environmental harm.

According to the World Health Organization, floods and droughts accounted for 90 percent of the natural disasters that occurred in the 1990s. These disasters affected almost two billion people. The great majority of these people lived in developing countries. Most vulnerable are people who directly depend on ecosystems for their survival, as well as those forced by poverty to live in landslide- and flood-prone areas. The best strategies for adapting to climate change will be strategies which also reduce poverty.

No one is certain how quickly our planet will warm or how global warming will alter local and regional climates. Measures to increase resilience to climate change should therefore be flexible, cost-effective and provide benefits under a wide-range of different climates. Adaptation should be done on a no-regrets principle: strategies should improve water management and the livelihoods of the poor even under current climate conditions.

Lastly, adaptation measures should seek to mitigate the damage to ecosystems from current and future human activities as well as from climate change. Freshwater ecosystems are under severe stress from water-management infrastructure and other human activities. Climate change will exacerbate the pressure on these ecosystems.

ENSURING ADEQUATE WATER SUPPLY

Reducing demand

The best flexible, cost-effective, no-regrets adaptation measure is to lower demand for water by reducing waste and improving the efficiency of its use. If we need less water for our farms, factories and homes, it will matter less when droughts cut into available supplies. Reducing demand can make more water available to ecosystems, thus increasing their resilience to climate change. It is almost always cheaper to bring down demand than to increase supplies.

Underground storage

Rain rarely falls exactly when needed for human use. Some method of storing water is therefore essential, especially in areas with infrequent and unreliable rainfall or river flow. By far the best place to store water is underground. Unlike water in surface reservoirs, water stored underground does not consume land or displace people, does not evaporate and does not depend on expensive and destructive dams.

Adaptation to climate change will require a drastic improvement in the management of underground water sources, which are the main supply for billions of people but are being rapidly depleted. Major regulatory and management changes (such as shifting to less water intensive crops, installing more efficient irrigation technologies and taking land out of irrigated production) are urgently needed to control groundwater mining.

Measures to reduce groundwater use must be accompanied by a major increase in efforts to recharge aquifers. Harvesting rainwater behind small dams and embankments is one proven method of doing this.

Rainwater harvesting is much cheaper than large storage projects and can be implemented with local labor, materials and expertise. Mobilizing rural communities around rainwater harvesting has catalyzed the establishment and empowerment of local political structures, which help poor people gain control over and improve many aspects of their lives. Rainwater harvesting alleviates poverty by enabling farmers to increase yields. It lightens the workload of women who have the responsibility for gathering water. Rainwater harvesting can also provide more geographically widespread benefits than big reservoirs, which help only the limited areas that can be reached with canals and pipelines.

Rainwater harvesting can also help drought-proof urban areas. Cities in Japan, Germany and India have passed ordinances requiring new buildings to include rainwater tanks. Urban areas can also make themselves more climate-resilient by reusing wastewater, and in some cases building desalination plants as a back-up source.

Problems with surface storage

The World Bank, World Water Council and other pro-dam lobbies argue that adapting to climate change will require increasing surface water storage and supply by building more dams and long-distance water transfer schemes. Focusing adaptation on building new megaprojects would be expensive and inflexible, would worsen poverty and environmental damage, and simply would not work.

The drawbacks of large surface reservoirs will be magnified by climate change. Reservoirs lose water to evaporation, which will increase as temperatures rise (evaporation from large reservoirs is already equal to about five percent of global water withdrawals). Sedimentation reduces the amount of water that reservoirs can store. The rate of sedimentation will increase as worsening storms, droughts and wildfires increase soil erosion.

A warming climate also threatens dam safety. Engineers build dams to cope with extreme floods that are predicted based on hydrological records. But as the climate changes, it gets harder to guarantee that the spillways of existing or planned dams will be able to cope with future floods. When a spillway is overwhelmed there is a high risk of a dam break, with potentially catastrophic consequences for people downstream.

FLOOD CONTROL VS FLOOD MANAGEMENT

Around the world, flood damage is steadily increasing due to complex factors such as land degradation, poor urban planning and the construction of counterproductive dams and embankments for flood control. Without a doubt, however, increasingly intense rainstorms are also a major cause.

Flood damages have increased rapidly worldwide, in spite of expenditures of tens of billions of dollars on conventional flood control measures. It is increasingly apparent that non-structural solutions are essential to effective flood management. These include implementing flood warning systems, preparing evacuation plans, discouraging floodplain development, improving drainage and giving rivers room to flood by restoring wetlands and demolishing or moving back embankments. Embankments should have a limited role in flood management, such as protecting vulnerable urban areas.

REDUCING ENERGY VULNERABILITY

Dependence on hydropower multiplies countries' vulnerability to global warming. When a serious drought strikes, a hydro-dependent country has to cope with not just water shortages and reduced agricultural production, but also cutbacks in industrial output due to energy shortages.

Hydropower provides more than 50 percent of the total electricity supply in 63 countries. Hydro-dependent countries that have suffered drought-induced blackouts and energy rationing in recent years include Albania, Brazil, Chile, Colombia, Ecuador, Ghana, Guatemala, Kenya, Peru, Sri Lanka, Tajikistan, Thailand, Vietnam, Zambia and Zimbabwe.

Key no-regrets adaptation policies for hydro-dependent countries include improving the efficiency of energy use and diversification of supply, especially by developing new renewable sources such as wind, efficient biomass and solar.

Lessening the damage caused by a continuously warming atmosphere will require societies to make extraordinary efforts to adapt to new climate patterns. Effective adaptation to the hydrological impacts of global warming fortunately provides an opportunity to take measures that provide many benefits even in the absence of climate change.

IRN supports local communities working to protect their rivers and watersheds. We work to halt destructive river development projects and to encourage equitable and sustainable methods of meeting needs for water, energy and flood management. Published in 2003.