India:
Research supports groundwater policy makers

Farmers have used underground aquifers as a convenient source of water for centuries. But in recent years a transformation has taken place. Newly available cheap diesel and electric pumps suddenly made on-farm wells a reality for many smallholders. Pumping allowed farmers to dig deeper and withdraw greater volumes of water, allowing them to grow higher value crops. Combined with cheap energy, investment in the new equipment suddenly made economic sense, leading to an extraordinary boom in groundwater use.

Some commentators have branded this trend a new “anarchy,” fearing that overexploitation tube wells are sunk in India every year – that’s one every 30 seconds. Suddenly made economic sense, leading to an extraordinary boom in groundwater use. Combined with cheap energy, investment in the new equipment suddenly made economic sense, leading to an extraordinary boom in groundwater use. Combined with cheap energy, investment in the new equipment suddenly made economic sense, leading to an extraordinary boom in groundwater use.

Nowhere has this change been more striking than in India. It is estimated that a million new tube wells are sunk in India every year – that’s one every 30 seconds. Some commentators have branded this trend a new “anarchy,” fearing that overexploitation could irreversibly deplete water tables beyond their capacity to recharge through rainfall. This would mean that more and more energy would become needed to extract water from ever deeper wells, whilst also increasing the risk of a decline in water quality.

But research by the International Water Management Institute (IWMI) presents a more nuanced picture: Some drier areas in India urgently need to regulate groundwater to make its use more sustainable. Other wetter areas, however, could do more to help poor farmers boost their incomes through improved groundwater access. India’s policy makers are taking notice.

The Gujarat experience

Gujarat is one of India’s driest states and long had one of the country’s most volatile agrarian economies. Because public irrigation was limited, the government encouraged groundwater irrigation by subsidizing farm electricity supply. However, by the 1990s this policy had bankrupted the government electric utility and severely depleted Gujarat’s aquifer.

Researchers, including a team from IWMI, helped formulate a new policy that delivered dramatic results, recommending a practical solution with three components: intelligent rationing of farm power supply to match farmers’ irrigation needs; a roster of power supply to prohibitively expensive for many smaller farmers, especially if they were far from the existing electric power grid. Previously farmers had to pay for the full cost of wires, poles and transformers; something that most urban customers did not have to do. This was prohibitively expensive for many smaller farmers, especially if they were far from the existing electric power supply line.

Under the new scheme, dubbed Jyotigram Yojana or ‘lighted village’, US$ 260 million was invested in separating electricity feeder lines for agricultural and non-agricultural users to make farm power rationing effective and tamper proof.

By providing regular and reliable full-voltage power, Jyotigram Yojana made it possible for farmers to keep to their irrigation schedules, conserve water, save on pump maintenance costs and use labor more efficiently. While the gross domestic product from agriculture grew at just under 3% per annum for India as a whole, Gujarat recorded nearly 10% growth in the seven years from the projects inception- the highest in India. Reducing some of the risk involved in farming helped boost on-farm incomes, which meant less out-migration to cities.

The West Bengal experience

A stark contrast to the Gujarat experience, however, is in the Ganges basin of Eastern India where water is more plentiful. Here actively encouraging groundwater use can benefit small farmers without significantly affecting sustainable supplies.

With a population of 91 million, West Bengal is eastern India’s most populous state and land is scarce. In order to sustain such a large number of people, farmers need to harvest two to three crops per year.

Given the climate, this is entirely possible, but access to water is often a limiting factor. Tanks and ponds in the state are often dry by January leaving little surface water available for crops until the monsoon rain starts in June. This makes groundwater a vital resource during the dry part of the year.

The state government was aware that other areas of India which had encouraged unregulated groundwater had experienced huge problems. So, in 2005, it introduced legislation to compel farmers to apply for permits for tube well pumps. The intention was laudable: achieving sustainable groundwater use and maintaining an inventory of wells. But applying for a permit was costly and time consuming. As a result, most poor farmers were forced to hire expensive diesel pumps for irrigation. Agricultural growth in the state slumped from 6% per annum in the 1990s, to just under 2%.

An IWMI research team was asked to help. Using data collected during several years of fieldwork, funded in part by the Bill & Melinda Gates Foundation, IWMI suggested that the authorities scrap the permit system for small pumps and introduce a fixed fee for connecting a tube-well to the electricity grid. Previously farmers had to pay for the full cost of wires, poles and transformers; something that most urban customers did not have to do. This was prohibitively expensive for many smaller farmers, especially if they were far from the existing electric power supply line.

Two months after the policy recommendations were presented to the state government, both propositions were accepted.

Research to support well-informed policies

India’s varied experience in groundwater exploitation is instructive. As climate change and population growth put more pressure on agricultural systems, groundwater will become an increasingly important resource.

Used wisely, it is a priceless water storage option than can keep crops watered throughout the year. This can only happen, however, if policy decisions are underpinned by careful research focusing on both equity and sustainability.
Farmers have used groundwater as a convenient source of water for centuries. But in recent years a transformation has taken place. Newly available cheap diesel and electric pumps suddenly made on-farm wells a reality for many smallholders. Pumping allowed farmers to dig deeper and withdraw greater volumes of water, allowing them to grow higher value crops. Combined with cheap energy, investment in the new equipment suddenly made economic sense, leading to an extraordinary boom in groundwater use.

Nowhere has this change been more striking than in India. It is estimated that a million new tube wells are sunk in India every year – that’s one every 30 seconds.

Some commentators have branded this trend a new “anarchy,” fearing that overexploitation could irreversibly deplete water tables beyond their capacity to recharge through rainfall. This would mean that more and more energy would become needed to extract water from ever deeper wells, whilst also increasing the risk of a decline in water quality.

But research by the International Water Management Institute (IWMI) presents a more nuanced picture: Some drier areas in India urgently need to regulate groundwater to make its use more sustainable. Other wetter areas, however, could do more to help poor farmers boost their incomes through improved groundwater access. India’s policy makers are taking notice.

Farmer’s experience

Gujarat is one of India’s driest states and long had one of the country’s most volatile agrarian economies. Because public irrigation was limited, the government encouraged groundwater irrigation by subsidizing farm electricity supply. However, by the 1990s this policy had bankrupted the government electric utility and severely depleted Gujarat’s aquifer.

Researchers, including a team from IWMI, helped formulate a new policy that delivered dramatic results, recommending a practical solution with three components: intelligent rationing of farm power supply to match farmers’ irrigation needs; a roster of power supply to the state government instead of individual farmers; and a new system of metering for water use.

Two months after the policy recommendations were presented to the state government, both propositions were accepted.

The West Bengal experience

A stark contrast to the Gujarat experience, however, is in the Ganges basin of Eastern India where water is more plentiful. Here actively encouraging groundwater use can benefit small farmers without significantly affecting sustainable supplies.

With a population of 91 million, West Bengal is eastern India’s most populous state and land is scarce. In order to sustain such a large number of people, farmers need to harvest two to three crops per year.

Given the climate, this is entirely possible, but access to water is often a limiting factor. Tanks and ponds in the state are often dry by January leaving little surface water available for crops until the monsoon rain starts in June. This makes groundwater a vital resource during the dry part of the year.

The state government was aware that other areas of India which had encouraged unregulated groundwater had experienced huge problems. So, in 2005, it introduced legislation to compel farmers to apply for permits for tube well pumps. The intention was laudable: achieving sustainable groundwater use and maintaining an inventory of wells. But applying for a permit was costly and time consuming. As a result, most poor farmers were forced to hire expensive diesel pumps for irrigation. Agricultural growth in the state slumped from 6% per annum in the 1990s, to just under 2%.

An IWMI research team was asked to help. Using data collected during several years of fieldwork, funded in part by the Bill & Melinda Gates Foundation, IWMI suggested that the authorities scrap the permit system for small pumps and introduce a fixed fee for connecting a tube-well to the electricity grid. Previously farmers had to pay for the full cost of wires, poles and transformers; something that most urban customers did not have to do. This was prohibitively expensive for many smaller farmers, especially if they were far from the existing electricity supply line.

Two months after the policy recommendations were presented to the state government, both propositions were accepted.

“Two months after the policy recommendations were presented to the state government, both propositions were accepted.”

Research to support well-informed policies

India’s varied experience in groundwater exploitation is instructive. As climate change and population growth put more pressure on agricultural systems, groundwater will become an increasingly important resource.

Used wisely, it is a priceless water storage option than can keep crops watered throughout the year. This can only happen, however, if policy decisions are underpinned by careful research focusing on both equity and sustainability.