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Adaptation – Pakistan

New Measuring Stations for Glaciers

The Indus, Pakistan's most important river, receives 70 percent of its water from the glaciers of the Himalayas. However, precisely glaciers are particularly affected by climate change. When and how they change, feed more or less water into the Indus, has a direct impact on the lives of millions of people in Pakistan. After all, they get their drinking water from the Indus and its tributaries and irrigate their fields from the same source; moreover, energy is also generated from that water by means of hydropower. Many people have also settled in villages and cities on the riverbanks, meaning that when flooding occurs, their very existence is immediately threatened. In addition, climate change is causing heavier rainfall, which poses a further risk to the population. Therefore, it is all the more important to monitor changes in the glaciers closely, both in the short and medium term, so that predictions can be made regarding water levels and run-off volumes. KfW Development Bank is therefore supporting the expansion of measuring stations below the glacial region of the upper Indus Valley.

term, irrigation management and power generation. Overall, variation in water transport seems to be increasing. However, as yet there has been insufficient research to identify the reasons for this. It is clear, though, that the glaciers are changing, even if the available data does not allow more accurate predictions, in any case none is able to cover a period longer than ten days. But there is definitely a need for longer-term predictions if people are to be brought to safety before floods occur, so that harvests can be saved and energy production adjusted accordingly.

Since the late 1960s, Pakistan's Water and Power Development Authority has had a number of hydrological and meteorological measuring stations along the Indus and its tributaries. However, these are not capable of

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Commissioned by	Federal Ministry for Economic Cooperation and Development (BMZ)
Country/Region	Pakistan
Project partner	Water and Power Development Authority Pakistan (WAPDA)

Context

Pakistan is one of the twenty countries most affected by global warming in the world. Higher temperatures and a greater intensity of heavy rainfall during the monsoon season have already been measured there in recent years – developments that have been linked with climate change. At the same time, changes in the climate impact the glaciers in the Himalaya-Karakorum-Hindu Kush region. Thus, knowledge about glaciers is very important in any hydrological planning when it comes to flood protection, securing the water supply in the long





Existing measuring station in a mountainous area of Pakistan: more to follow.
Source: WAPDA

registering critical levels of water, flowing in one or the other direction, early enough and reliably analysing them for areas further downstream. They are also located too far from the glaciers and are not automated, but have to be operated manually. That results in inaccuracies or errors and is limiting the time available for reading the data. Under these circumstances exact predictions are hardly possible. In short, as shown by the heavy flooding experienced in 2010 and 2011, even today the existing measuring system can no longer cope, let alone with future changes brought about by climate change.

Project approach

KfW is helping Pakistan to construct more and better measuring stations in the upper Indus Valley, directly below significant glaciers. Thanks to these stations it will be become possible to identify volumes of water run-off and changes in weather conditions as early and accurately as possible. Up to 30 new weather stations and 13 hydrological measuring stations are planned. Moreover, measurements will be taken automatically, around the clock, and the results transferred to the control centre in Lahore at short intervals. To that end, improvements are being made to the measurement technology and to data transmission capacities. In addition to this, the new equipment includes special vehicles that enable the experts to regularly maintain the stations in the high mountain ranges.

The control centre will also be better equipped, with more powerful computers, appropriate software and adequately trained staff. A new, modern office building able to accommodate far more employees is being built in Lahore. Pakistan's Water and Power Development

Authority has approved nearly 50 new positions and already identified some of the new employees. KfW's financing for the expansion of the "glacier monitoring system" totals at EUR 6 million, maybe more in a second phase. Phase I mainly covers the expansion of the measuring stations and the control centre. Phase II will focus on developing a better understanding of the effects of climate change on the permafrost in Pakistan and providing the relevant material as well as equipment for this. The project is planned to last for five years in total.

Impact

More accurate data allows for a more accurate prediction of water levels, leading to better water management and benefiting both agriculture and hydropower generation. Based on this data, more specific preventive measures can also be implemented when there is a threat of flooding. During the severe flood disaster just a few years ago alone, thousands of people died and millions lost their homes.

The economic benefits of better measuring systems are obvious but cannot be determined precisely at present. There is no doubt, however, that the benefits for the catchment population of the Indus – in the countryside and in cities – are considerable.



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