

# Climate change adaptation in China: monitoring and early warning of glacial lake outburst floods in the area of Yarkant River

Reducing climate change risks and vulnerabilities from glacial lake outburst floods



The melting ice from receding glaciers is heightening the risk for Glacier Lake Outburst Flood (GLOF) to critical levels all around the world. This Sino-Swiss cooperation aims at a better understanding of the phenomena and establishing an early warning system as well as glacier monitoring.

## Glacier Lake Outburst flood

By 2050 it is estimated that glaciers in Western China might be reduced by about 27% which will have an impact on the source of water for over 300 million people along the Yangtze and Yellow Rivers. The melting ice from these receding glaciers is heightening the risk of Glacier Lake Outburst flood (GLOF) to critical levels.

Yarkant River is located in the southwest of Xinjiang Province, at the margin of south-western Tarim Basin and ranks number one in Xinjiang in flood frequency and in losses caused by floods as well. The Yarkant floods are threatening an alluvial area of 50'000 km<sup>2</sup> with a population of more than 1 Mio. and causing damages and losses of about CHF 11.5 Mio. (RMB 70 Mio.) every year in average. There are 33 records of flood disasters during the 50 years between 1949 and 1999. The floods are provoked by meltwater, by rainstorms and – as most violent and disastrous – by glacial lake outbursts (GLOF), effectuating peak discharges of more than 6'000 m<sup>3</sup>/s. The

## The project in brief

---

### Domain

Global Cooperation

---

### Theme

Climate Change

---

### Land / Region

China

---

### Partners

Ministry of Water Resources  
Xinjiang Department of Water Resources  
Xinjiang Kashgar Hydrographic and Water Resources Bureau  
Bureau Water Resources of Kashgar Prefecture  
Kashagar Management Bureau of Tarim River Basin  
Swiss Federal Office for the Environment  
SwissRe  
ETH Zurich

---

### Starting point /

#### Background information

Average temperature in China has increased more than the global average. The melting ice from these receding glaciers is heightening the risk of Glacier Lake Outburst flood (GLOF) to critical levels.

---

### Project target

largest and most frequent glacial lake outbursts occur in the area of Keleqin River in Shaksgam valley in the Karakoram Mountains. Keleqin is one of several tributaries of Yarkant River.

### **Better understanding of the glacier under climate change conditions and early warning system**

The Sino-Swiss cooperation activities aim at improving the management of the high flood risks of Yarkant River, predominantly caused by glacier lake outburst floods and the long term monitoring of the respective glaciers and outburst hazards. The actions are structured into three phases: (1) Establishment of an early warning system for glacial lake outbursts, to be realized in 2011. (2) Risk management for the potential flood areas, to be realized in 2012 and (3) climate change monitoring and analysis, to be realized from 2013 on.

The planned measures combine remote sensing (optical and satellite data) analysis with terrestrial data measurements such as gauges close to the GLOF-prone area and monitoring cameras in the glacier area of Shaksgam Valley. Flood modeling and the elaboration of an automated Early Warning System and an emergency risk management plan are other key issues of the project.

To improve Chinese and international knowledge in the assessment of climate impacts and risks, and develop practical approaches to climate change adaptation and emergency response.

---

#### **Target group**

Vulnerable communities in the flood plain

---

#### **Costs**

Total budget: CHF 3'700'000  
SDC : CHF1'850'000

---

#### **Duration**

01.10.2010 – 31.12.2013

---

#### **Contact**

SDC – Global Programme  
Climate Change:  
[gpsc@eda.admin.ch](mailto:gpsc@eda.admin.ch)

---