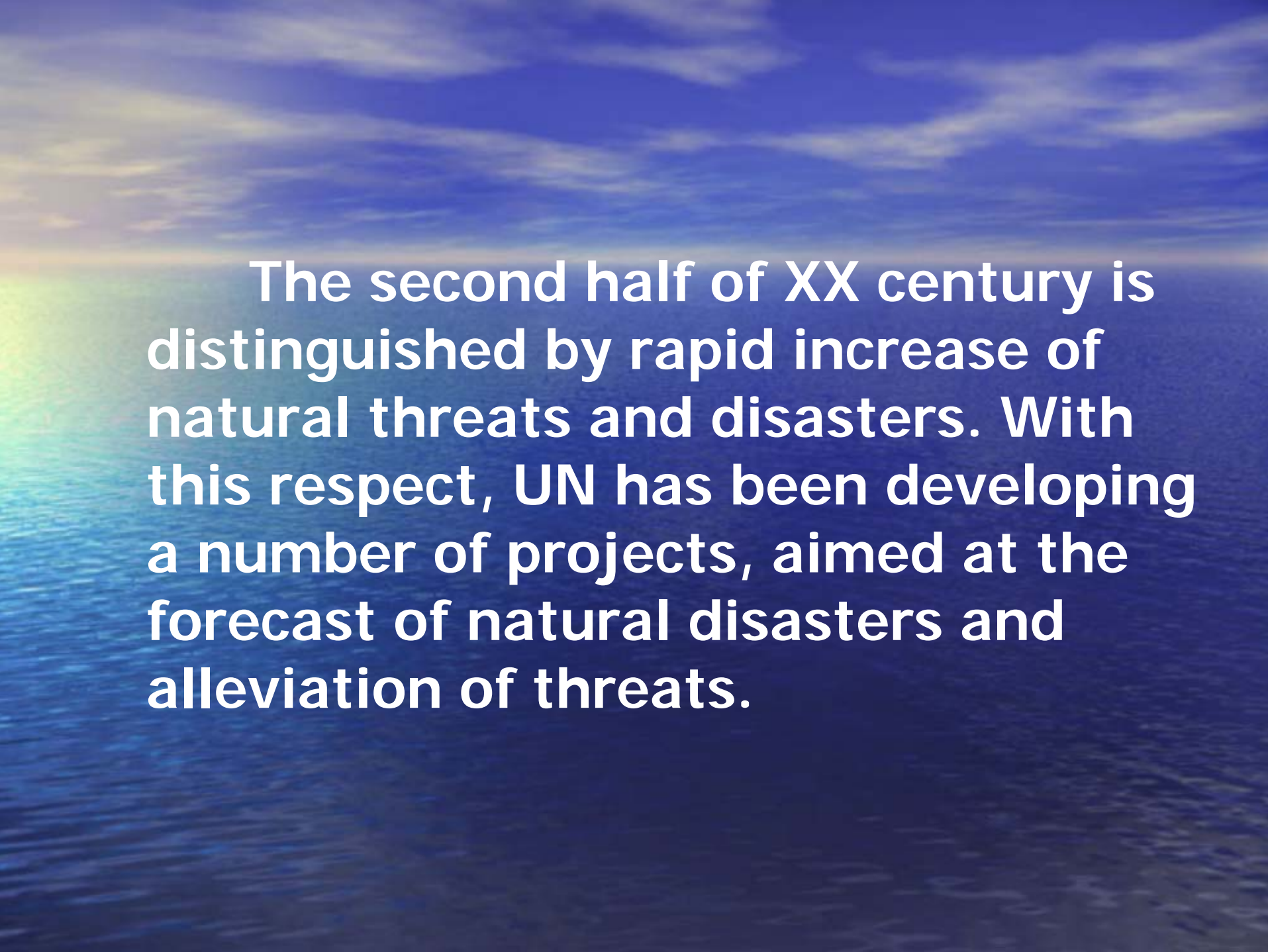


An aerial photograph of a mountain valley. A river flows through the center of the valley, winding between green hillsides. A road or path runs parallel to the river. The background shows steep, rocky mountain peaks under a clear sky.

THE ENVIRONMENTAL SECURITY AND WATER DISASTERS

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The second half of XX century is distinguished by rapid increase of natural threats and disasters. With this respect, UN has been developing a number of projects, aimed at the forecast of natural disasters and alleviation of threats.

Natural disasters and forming them factors are diverse. However, we will introduce the ones which are:

➤ formed in river basins



➤ conditioned by water flow



➤ dangerous for society and environment

They are overflows.

According to their origin, they can be:

- ❖ **downpour**
- ❖ **flood (conditioned by snowmelt and ice melt)**
- ❖ **wind-induced surge**
- ❖ **ice-jam and ice-dam**
- ❖ **dammed and cut-off**

Based on the researches on the overflows, it became clear that the overflows occupy:

- the first place by the number of emergence of natural disasters (about 40% of all the disasters)
- the second-third place by the number of casualty
- the first-third place by the degree of economic damage (billions of dollars)

In river basins, according to the degree of danger the overflows may be:



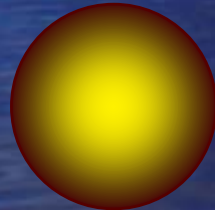
➤ weak



➤ average



➤ strong



➤ disastrous

- The strong and disastrous overflows emerge under the influence of two or more factors (for instance, snowmelt + rainfall, downpour + dam destruction, etc.).
- The downpour is the most widespread type of overflow. It can take place everywhere (except for Arctic and Antarctic), even in desert and semi-desert regions.
- Rain overflows are rather dangerous in mountainous dry, extreme continental climate regions. They considerably raise the level of river water.

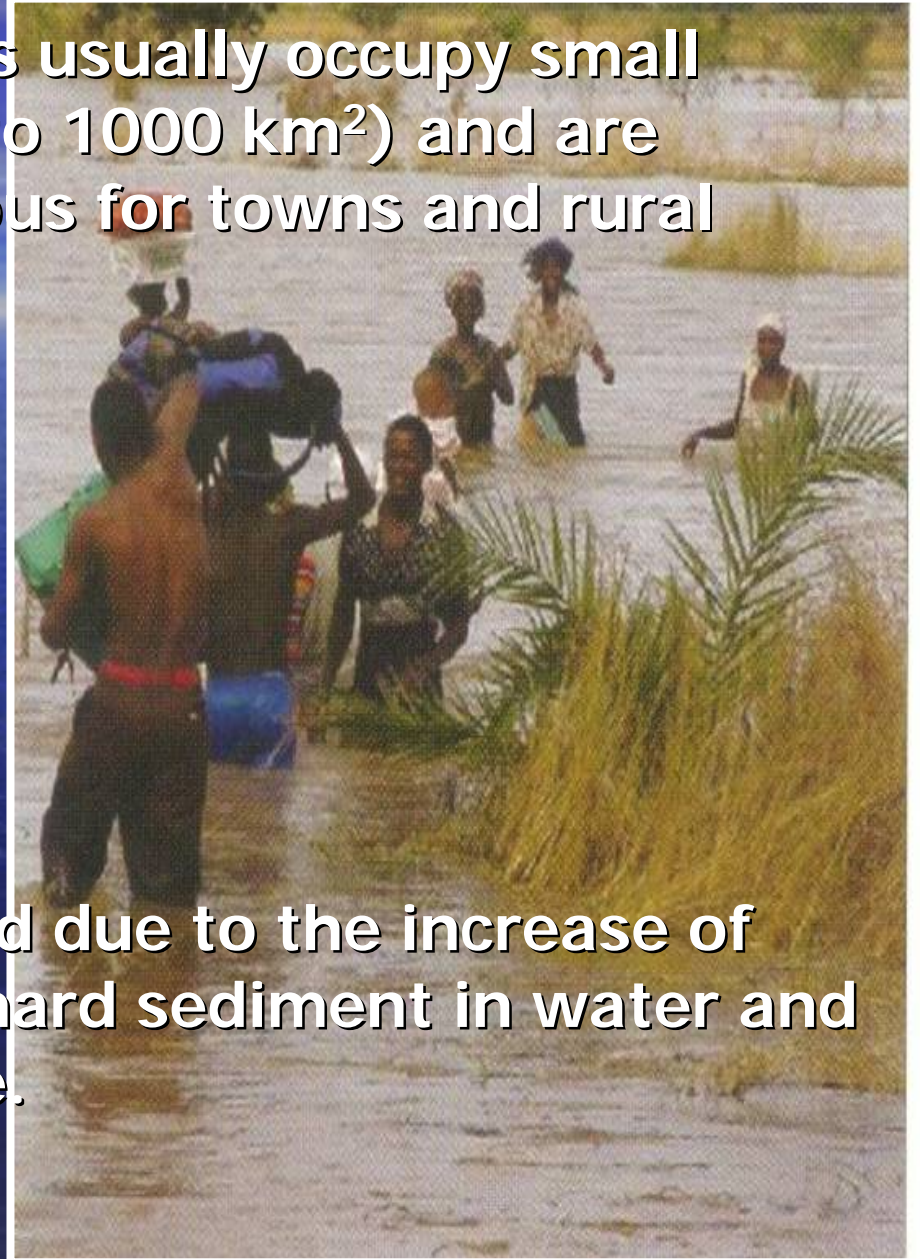
The causes of the emergence of this type of overflows are:

- short-term and intense rains (the annual portion of water from the rainfall may pour into river basins in single minutes)
- the geological structure of rock basin (90% of precipitation fallen on impermeable rocks form a flow)
- basin size
- the declivity of basin slopes
- the extent of vegetation cover of the basin
- the extent of basin dissection
- the anthropogenic factor
- others

❖ Downpour overflows usually occupy small drainage areas (up to 1000 km²) and are particularly dangerous for towns and rural areas.



❖ The threat is doubled due to the increase of the quantity of the hard sediment in water and mudflow emergence.



- Today, having a powerful scientific-technical potential and means, in particular, aerial space researches, photographing surveys, as well as geo-information system (GIS), man is able not only to forecast but also to prevent natural disasters.



It is important to build a geo-physical multi-factor mathematical "live" model able to operate.

The model must be nourished with the following information sources:



- manned satellites (geo-physical, climatic data as well as maps and photographs)

- geo-information stationary observation stations located on the Earth (data on flow-forming and other factors and others)





“Live” model



The model must work by means of:

- data permanently received in the geo-information system
- differential series obtained from the data and multi-factor links formed between them

All the factors may be classified into three large groups:

❖ climatic

❖ sub-surface layer

❖ anthropogenic

- ❖ The model must be very sensitive - to be able to fix and analyze any slightest change of any factor and possible consequences.
- ❖ The model must be able to define the factor or factors which for the given time or space may be disastrous.
- ❖ This kind of models can be built not only for downpour overflows but also for any natural disaster (even for earthquakes), with consideration of its peculiarities.

- **Any region must have its characteristic model, each of which can be different, if not divergent.**
-

These models can give the opportunity to forecast disasters and undertake necessary means for their prevention.

Thanks

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