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# Establishing human and technical capacities for advanced water resources management teaching

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Strengthening of master curricula in water resources management for the Western Balkans HEIs and stakeholders

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## Water resources and challenges

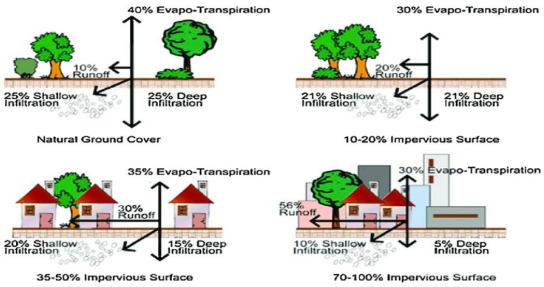
*„Numerous problems that arise regarding water resources can be directly or indirectly related to the wise management of water resources“*

**Water problems / issues - one of the greatest challenges of human society in the future**

One of the basic characteristics of water resources is the spatial and temporal irregular distribution

- Resources are under pressure / Pollution of water even at the source areas
- Populations under water stress / Shortage of drinking water
- Growing of waste water
- Rivers, sea, oceans pollutions
- Floods
- Big antropogenic influece / urbanisation, deforestation, change in land use
- Climate change???

*Too much water- floods – scarity of water – too much pollution*




Natural vs. Urbanized Water Cycle (epa.gov/caddis)

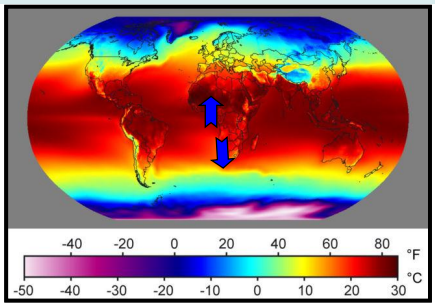
## Water resources and challenges

**Still unexplored impact of climate change on waters!!!**

*...changes in the intensity and duration of precipitation, reduction of snow cover, increase in temperature, increased evaporation, prolonged droughts, ....*

- The problems that water engineers will face are incrising, especially given the changing and uncertain future climate, and growing population that is driving increasing social and economic development, globalization and urbanization.

How to find the best answers to these challenges?




According to estimates, warming is spreading from the equator to the poles, ie from sea level to mountain tops

The way water is currently managed, in many areas, is wasteful and polluting, even though these cities have the inherent potential for more sustainable management.

Obviously, there is a need to identify the problem and then solve and implement it.

This will **require:**
**- innovative and acceptable institutional mechanisms and a balance between autonomy of water sector and inter-cooperation**

- Continuous education of experts and stakeholders in the field of water resources, cross-sectoral cooperation, cooperation with the business sector, cooperation with politics is needed.

- Continuing education also means investing in innovative techniques and technologies to select best environmental practices and best available techniques

**Can Water Management help in solving these problems?**

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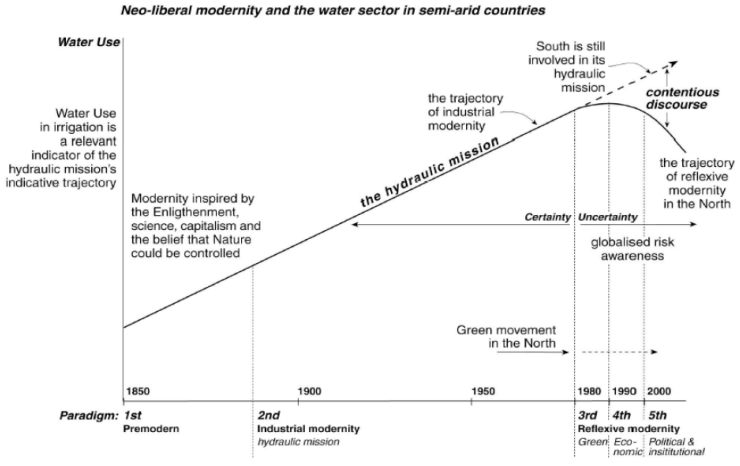
## Historical developments: towards IWRM

One of the ways to achieve improved water management is the implementation **of integrated water resources management** (IWRM).

The concept encompasses various aspects of water management, including environmental, technical, economic, social as well as political impacts and implications.



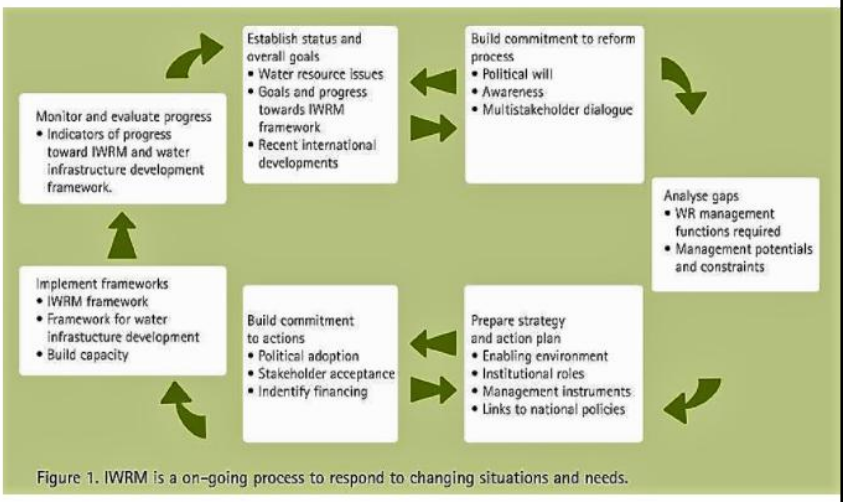

**The evolution of water resources management according to Allan (2003), with the five water management paradigms, (***Principles of Integrated Water Resources Management, Pieter van der Zaag and Hubert H.G.Savenije, UNESCO-IHE Delft, October 2014***)**

## Integrated Water Resources Management

**Integrated Water Resources Management (IWM) is a holistic way of strategic planning.**

Should be viewed as a process rather a one-shot approach; one that is long term and forward-moving but iterative rather than linear in nature.

It is important to stress that this concept **requires time and effort to implement** and requires **many organizations, from utilities and planners to politicians, to work more actively together**.




*IWRM is an on-going process to respond to changing situations and needs. Source: GWP (2004)*

## Conclusions

- With the dramatic changes in the water cycle expected in the coming years, traditional and fragmented approaches to water resource planning are simply not good enough.
- It is clear that only an integrated approach to water management can solve numerous problems of water - from water scarcity and climate extremes, floods, torrents, etc., to resource fragmentation, more water issues need to be addressed than ever before.
- The great potential lies in smart technologies that can help us make the right decisions faster.
- Advanced water management technologies can **efficiently collect, combine and analyze** complex data from a variety of sources **in real time**, which is one of the key factors **for making** urgent, **but good decisions**.
- To meet the set goals, we need continuous education of professional staff so that they can make the best decisions

# Content

**Thank you for your attention!**