

7th ASEM Sustainable Development Dialogue
Danube – Mekong Cooperation Initiative
11-12 September 2018, Budapest

Session 5: **Modern water resources management in education –
challenges of the 21st century**

EDUCATION FOR MODERN WATER MANAGEMENT: CURRENT CHALLENGES IN WATER EDUCATION

András SZÖLLÖSI-NAGY

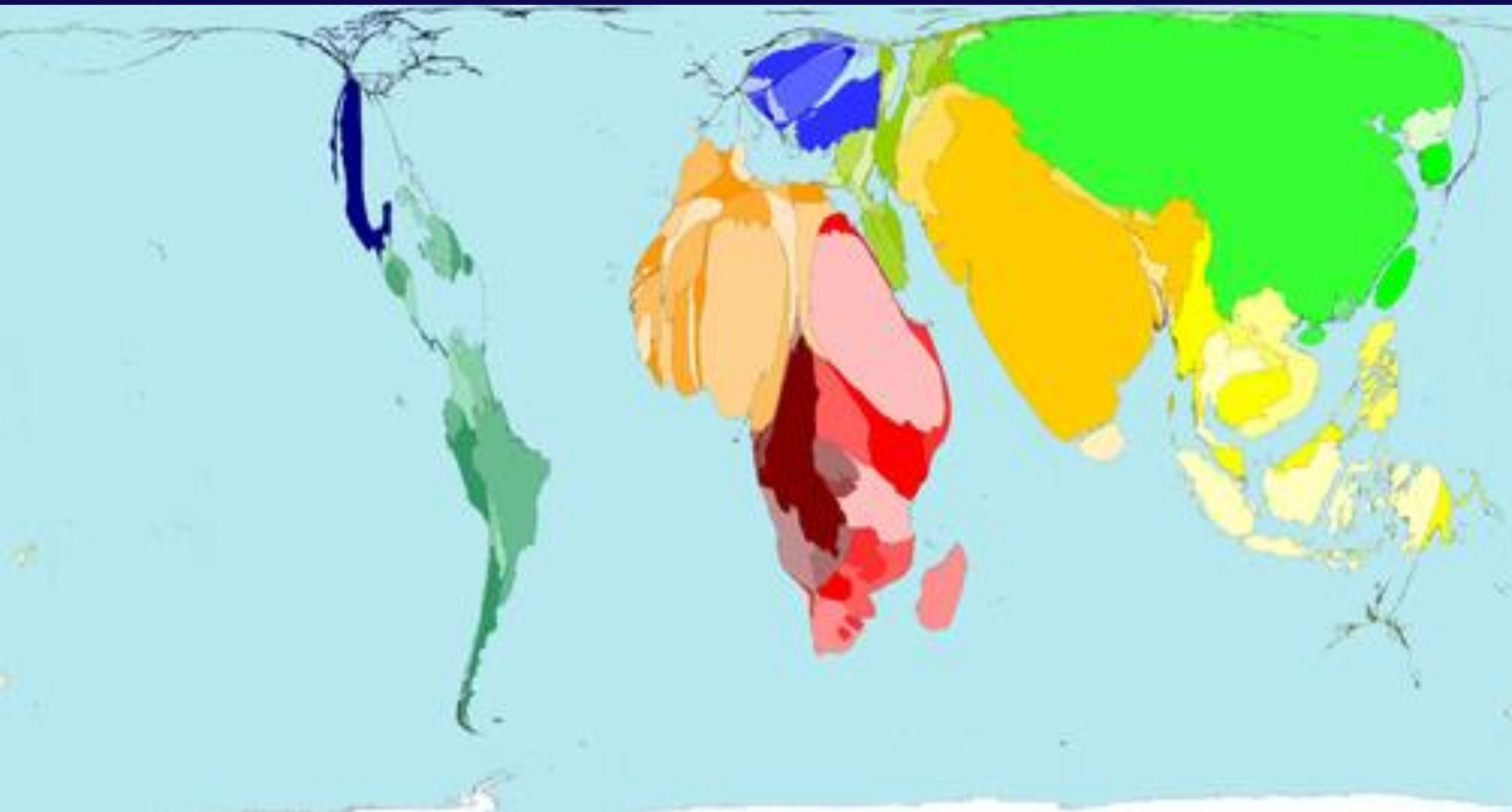
National University of Public Service, Budapest, Hungary
UNESCO International Hydrological Programme
Sustainable Water Futures Programme, Brisbane, Australia
World Water Council, Marseille

GLOBAL FRESHWATER RESOURCES

Relation between water availability and population



Area proportional with non-access to drinking water 2011



Sustainable Development Goals (SDGs)

1 NO
POVERTY



2 ZERO
HUNGER



3 GOOD HEALTH
AND WELL-BEING



4 QUALITY
EDUCATION



5 GENDER
EQUALITY



6 CLEAN WATER
AND SANITATION



7 AFFORDABLE AND
CLEAN ENERGY



8 DECENT WORK AND
ECONOMIC GROWTH



9 INDUSTRY, INNOVATION
AND INFRASTRUCTURE



10 REDUCED
INEQUALITIES



11 SUSTAINABLE CITIES
AND COMMUNITIES



12 RESPONSIBLE
CONSUMPTION
AND PRODUCTION



13 CLIMATE
ACTION



14 LIFE
BELOW WATER



15 LIFE
ON LAND



16 PEACE, JUSTICE
AND STRONG
INSTITUTIONS



17 PARTNERSHIPS
FOR THE GOALS



SUSTAINABLE
DEVELOPMENT
GOALS

WATER AS THE CENTER PIECE OF THE SDGs





LOOMING WATER CRISES

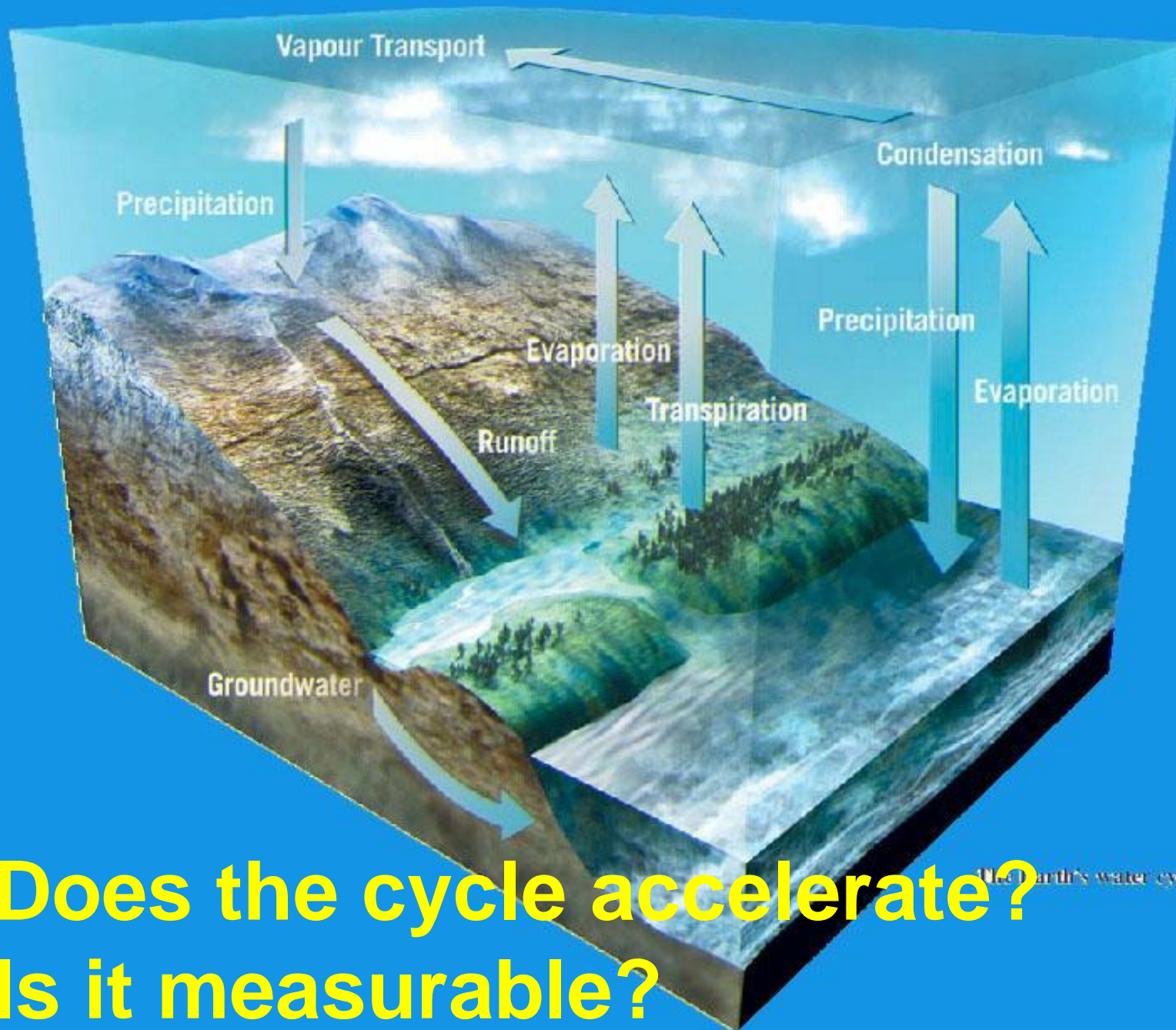
The time of easy water is over

HEADLINE NEWS!!!!!!

The climate is changing !!!

(Yap, for 4 billion years now ...)

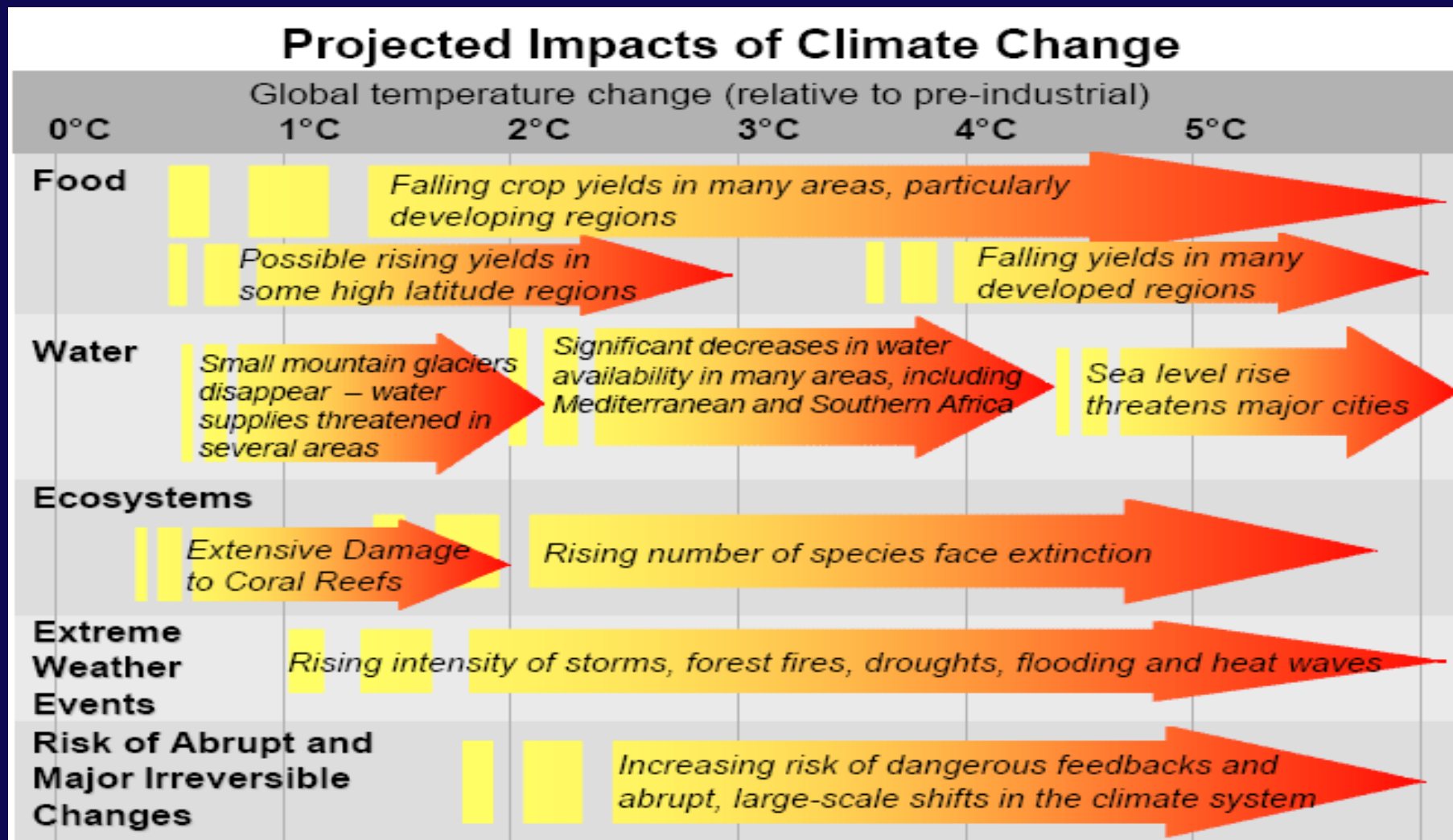




The Earth's water cycle

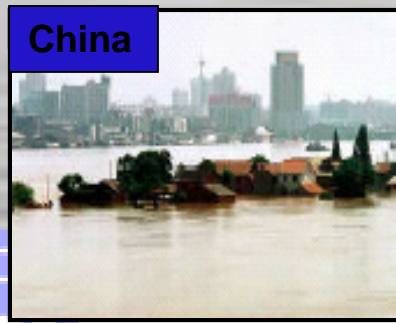
**Does the cycle accelerate?
Is it measurable?**

Climate change is effecting our environment, our societies and our cultures



(Source: IPCC)

Major floods and droughts worldwide



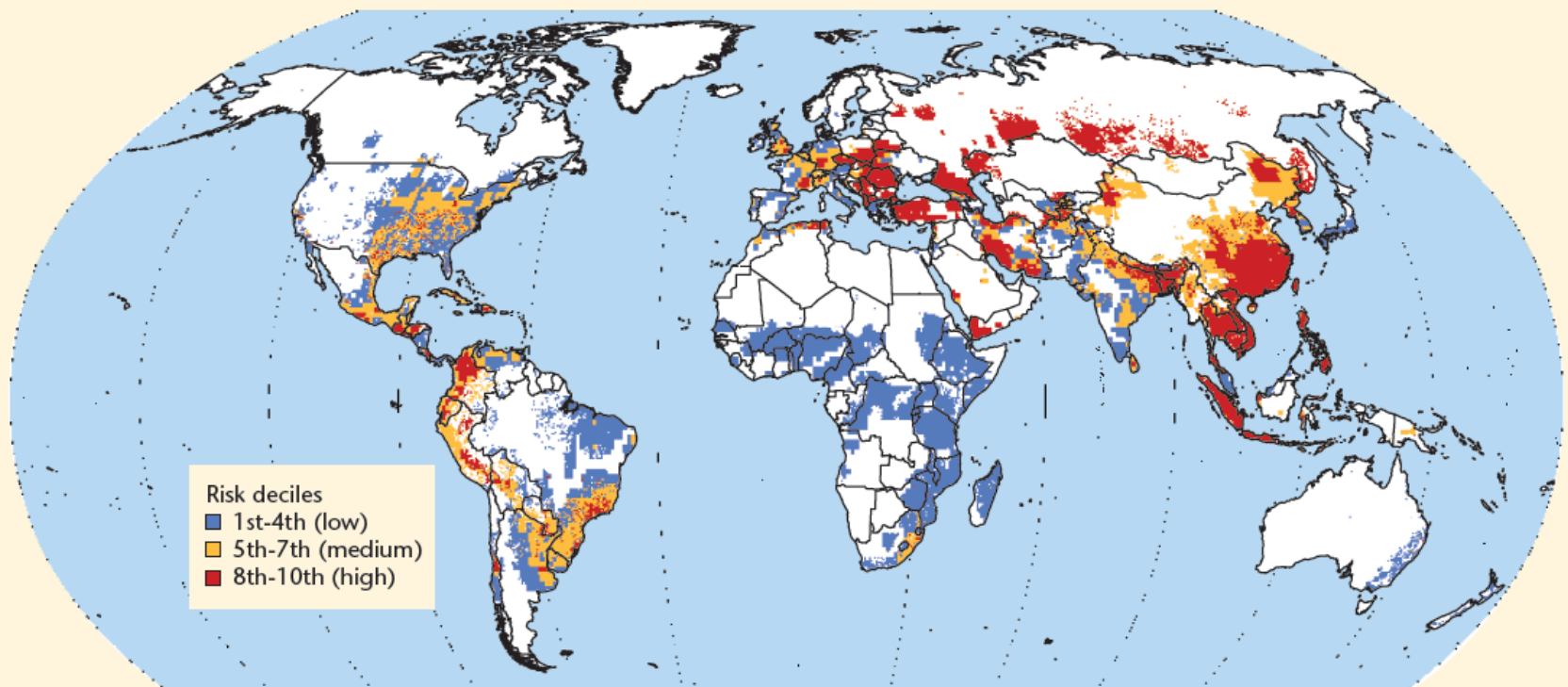
 Flood  Drought



There is pressing need to develop advanced risk management on water hazard in order to secure human life and ensure sustainable socio-economic development and poverty alleviation.

FLOOD LOSSES IN FUNCTION OF GDP

Map 10.3 Impact of flood losses (comparative losses based on national GDP)

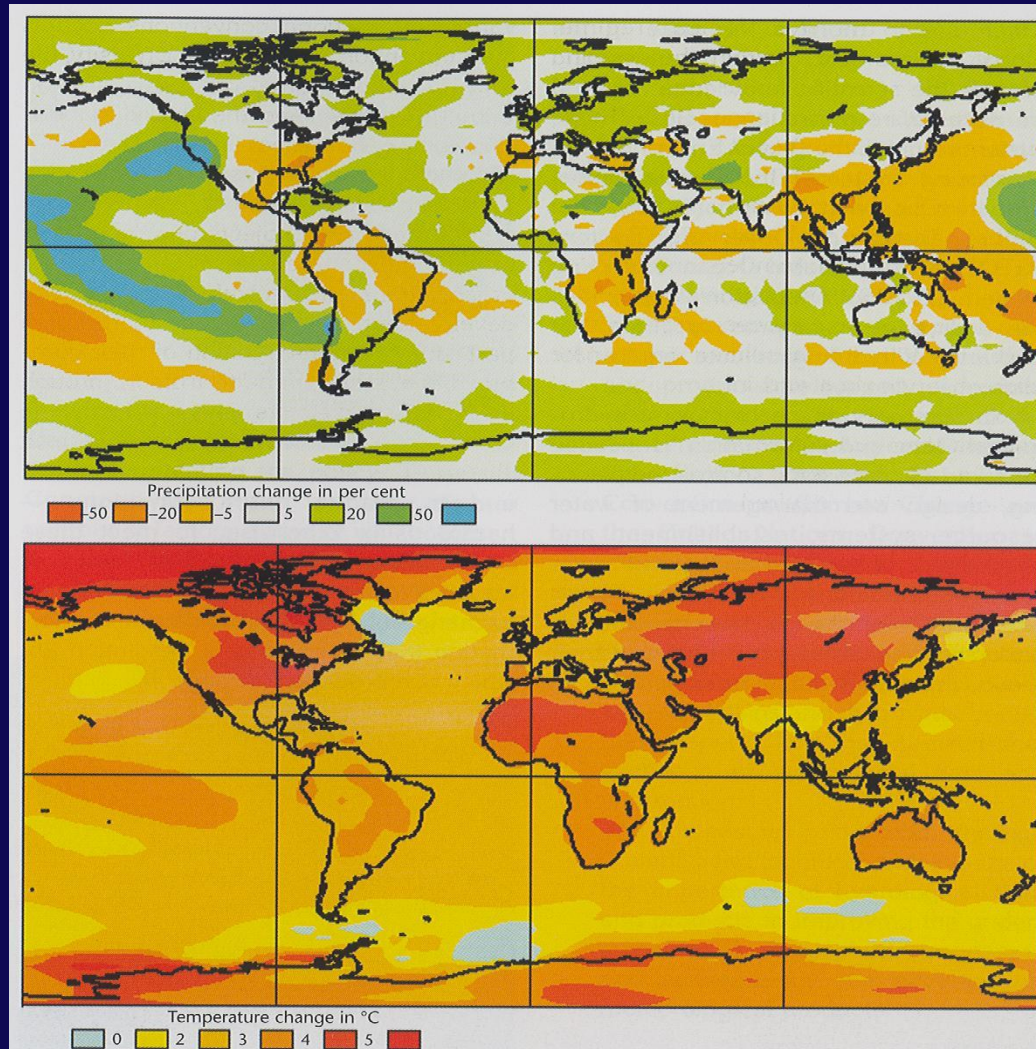


Note: Deciles refer to the level of risk, normalized for comparing 10 categories.

Source: Based on Dilley et al. 2005.

NOT TOO MUCH HOPE ...

UNLESS POLITICAL LEADERS STICK TO THE PARIS AGREEMENT





CLIMATE CHANGE IS ALL ABOUT WATER

KEY TO SUSTAINABILITY:

**CLIMATE ADAPTIVE
WATER STRATEGIES**

**DO WE HAVE A
CHOICE?**

**WE NEED TO INCREASE THE
RESILIENCE
OF OUR SYSTEMS**



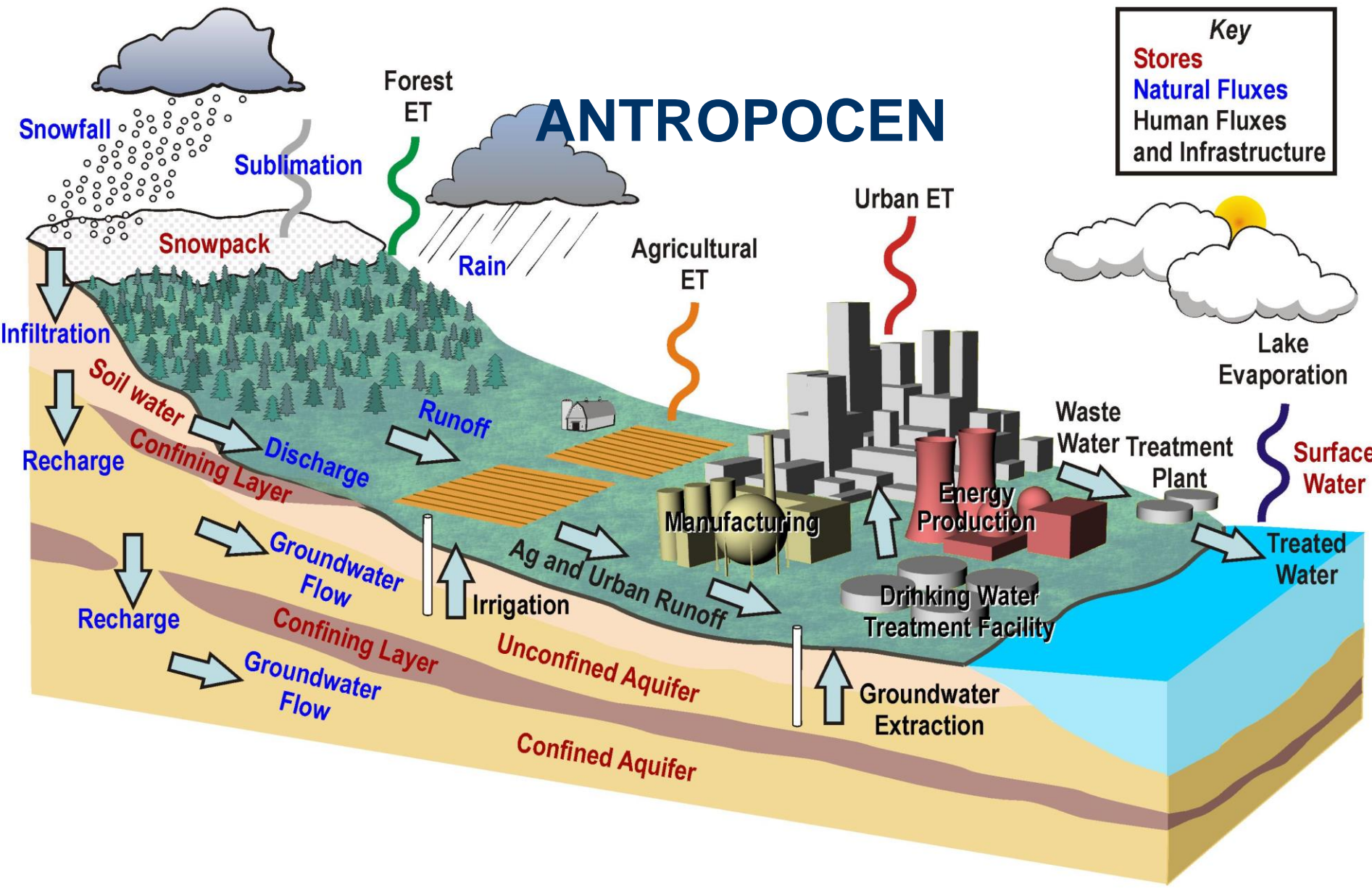
WE WILL NEED MORE STORAGE

**STORAGE IS THE NEXUS BETWEEN
WATER / FOOD / ENERGY**



ANTROPOCEN

Key
Stores
Natural Fluxes
Human Fluxes and Infrastructure

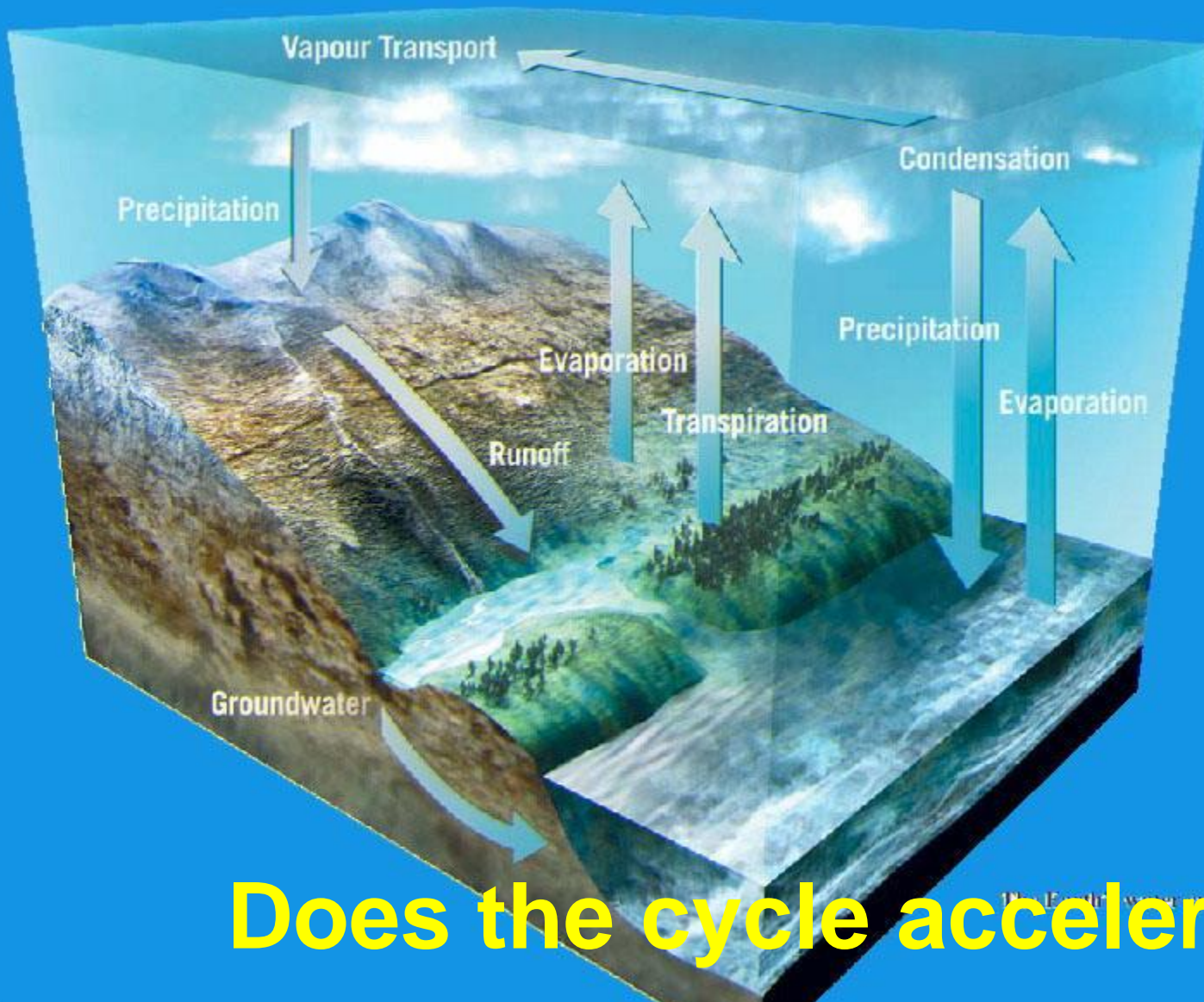




STATIONARITY IS DEAD

The story of the 200-year flood

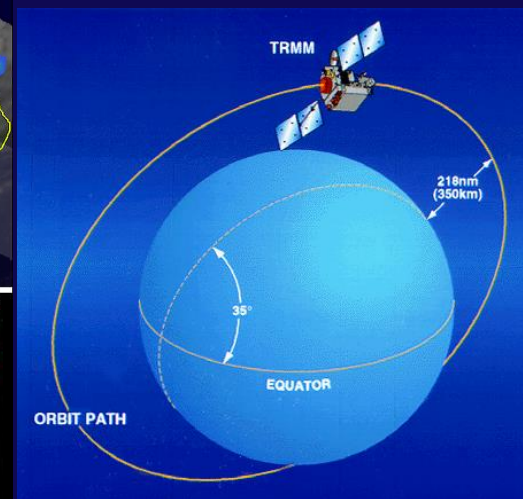
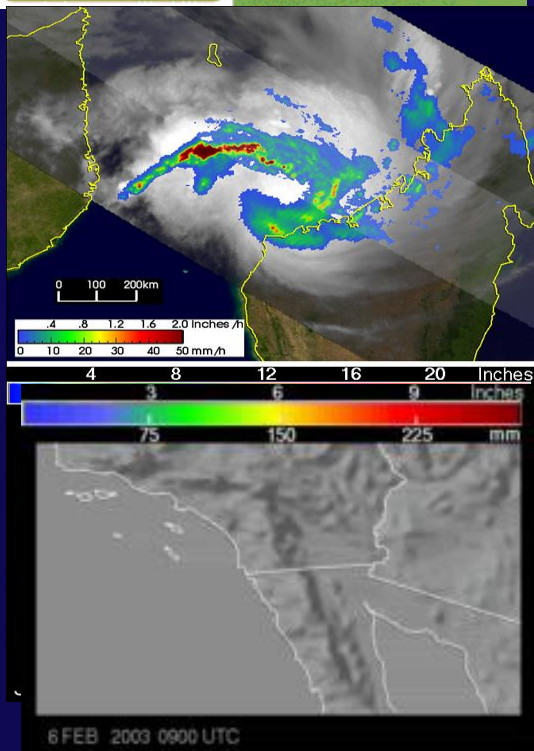
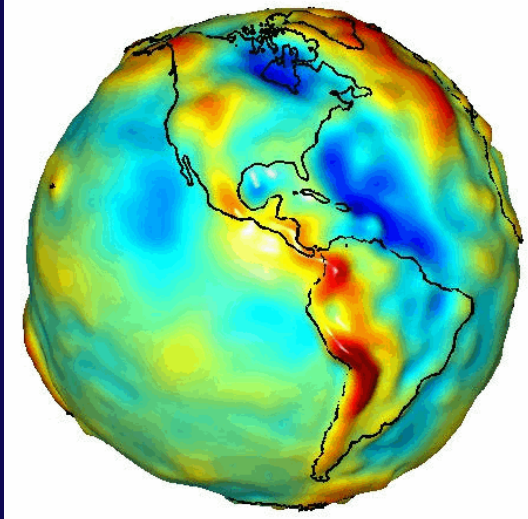
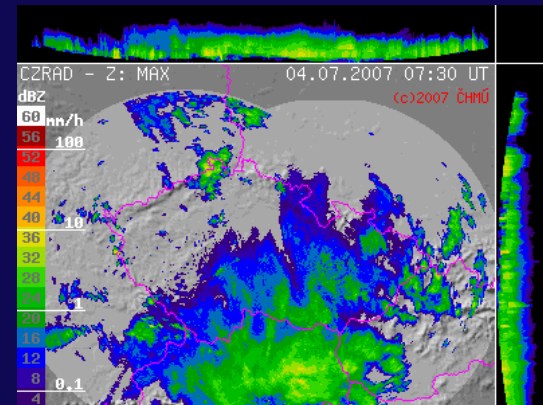
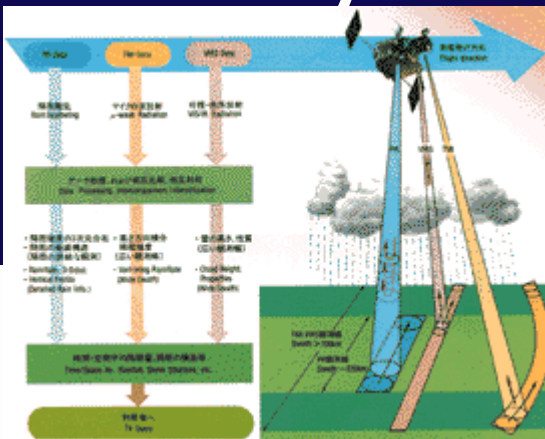
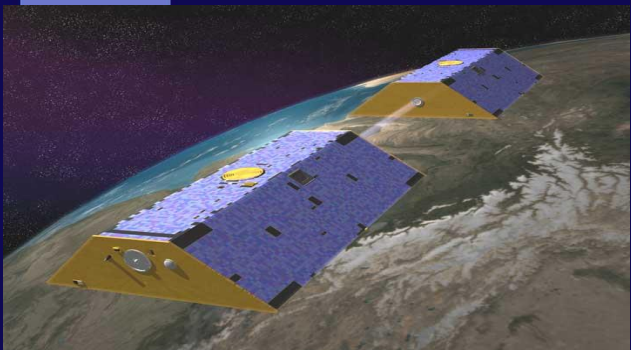
New technologies are needed



**Does the cycle accelerate?
Probably ... but ...**

**IF YOU CAN'T MEASURE IT
(NEAR) REAL TIME
AND IF YOU DON'T HAVE
THE
RIGHT DIGITAL
TECHNOLOGY
YOU CAN'T MANAGE IT**

Remotely sensed data



(Source: D. Solomatine)



Flow of information in a Hydroinformatics systems

Data → Models → Knowledge → Decisions

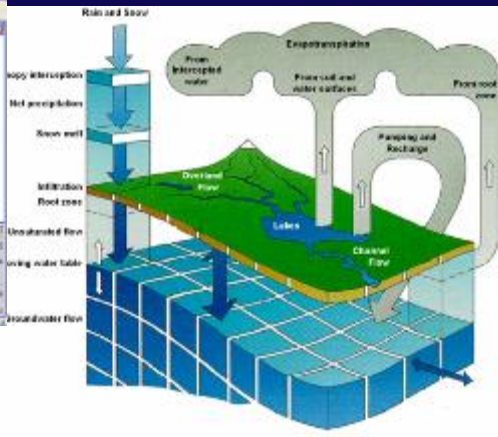
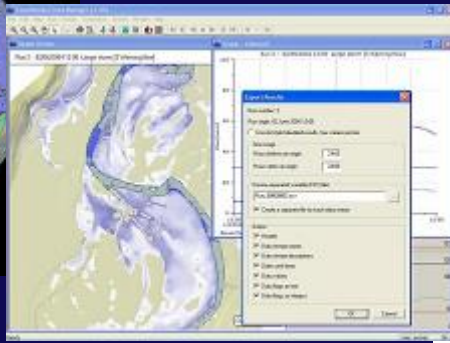
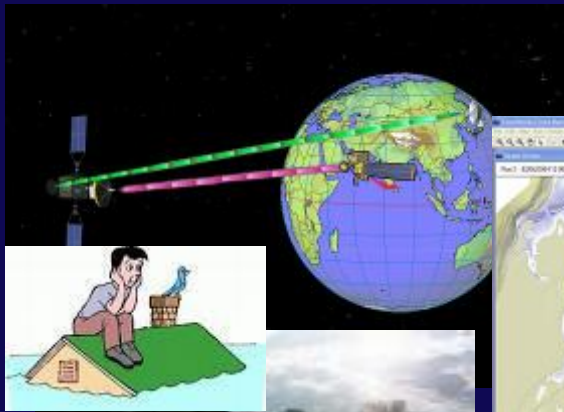
Earth observation,
monitoring

Numerical Weather
Prediction Models

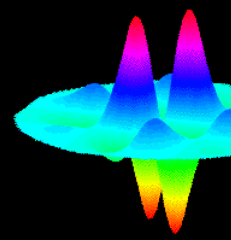
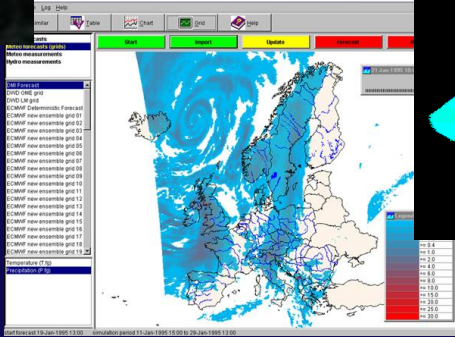
Data modelling,
integration with
hydrologic and
hydraulic models

Access to
modelling
results

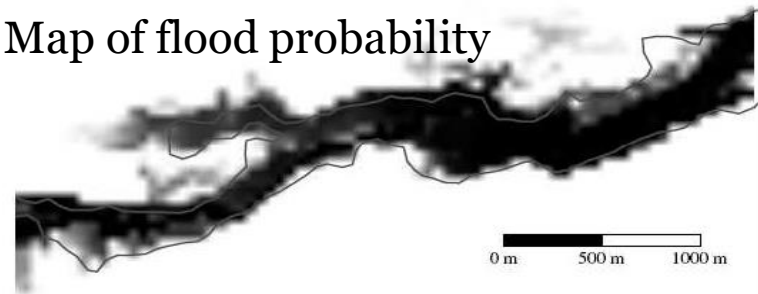
Decision
support

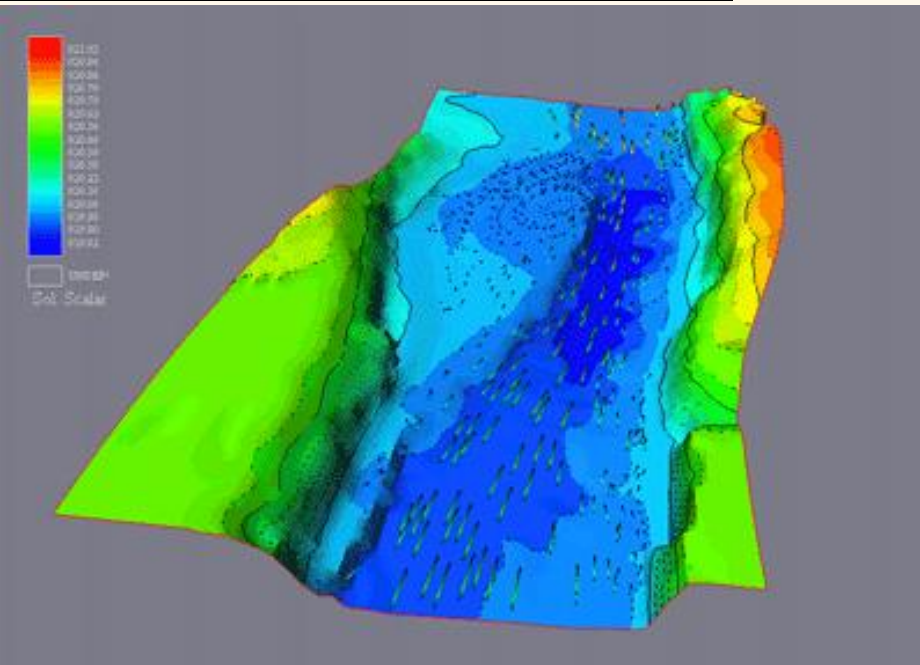
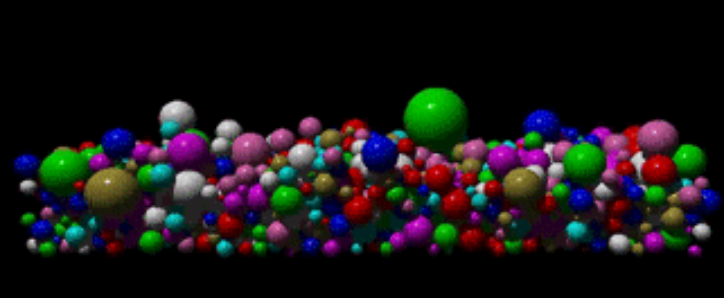


Simulation of Delt-FEWS for an European Flood Forecasting System (EFFS), showing forecast precipitation over Europe for the 1995 event imported from the Danish Meteorological Institute



Map of flood probability





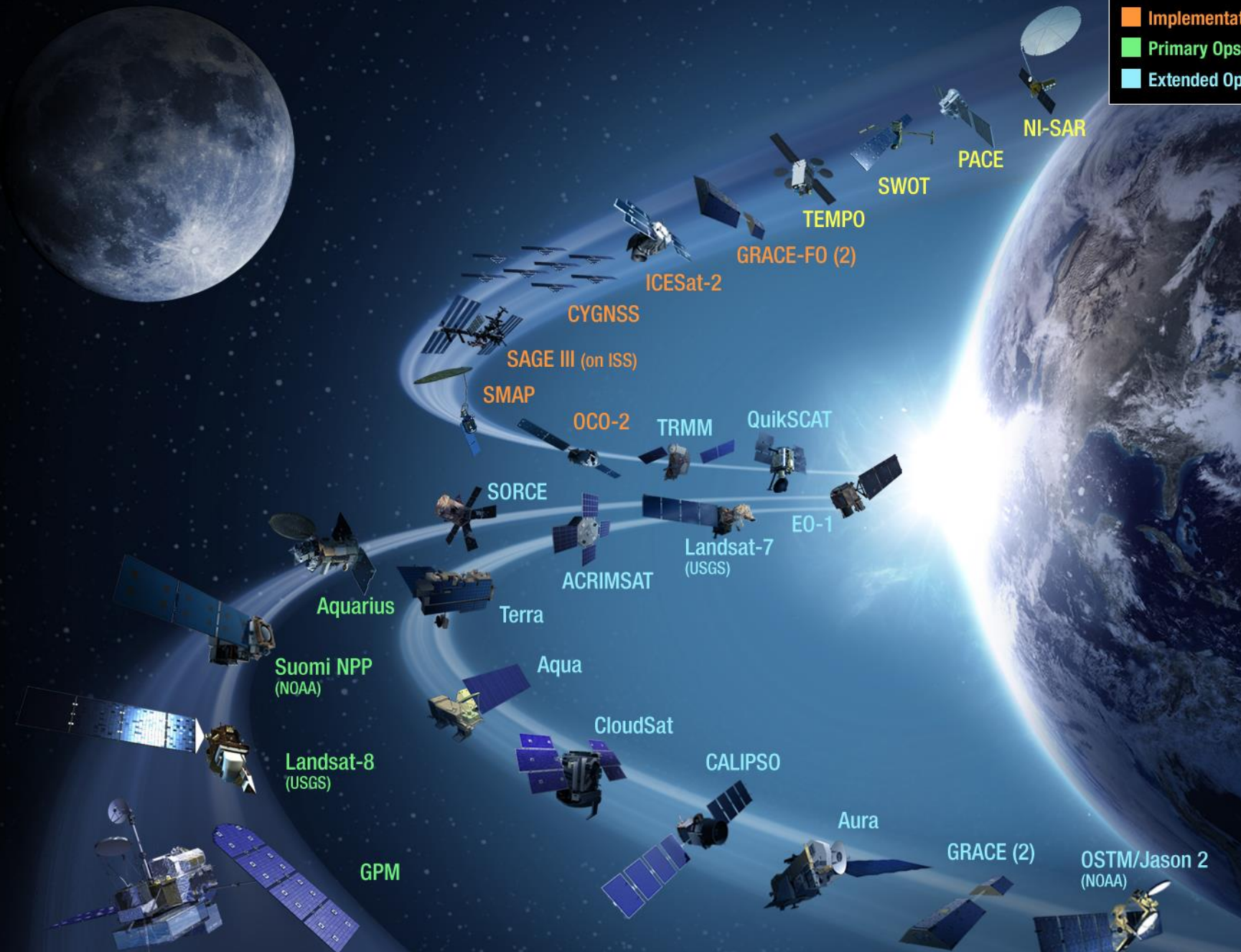
Modeling is the heart ...

Technologies support the whole information cycle, and *integrate data, models, and humans*

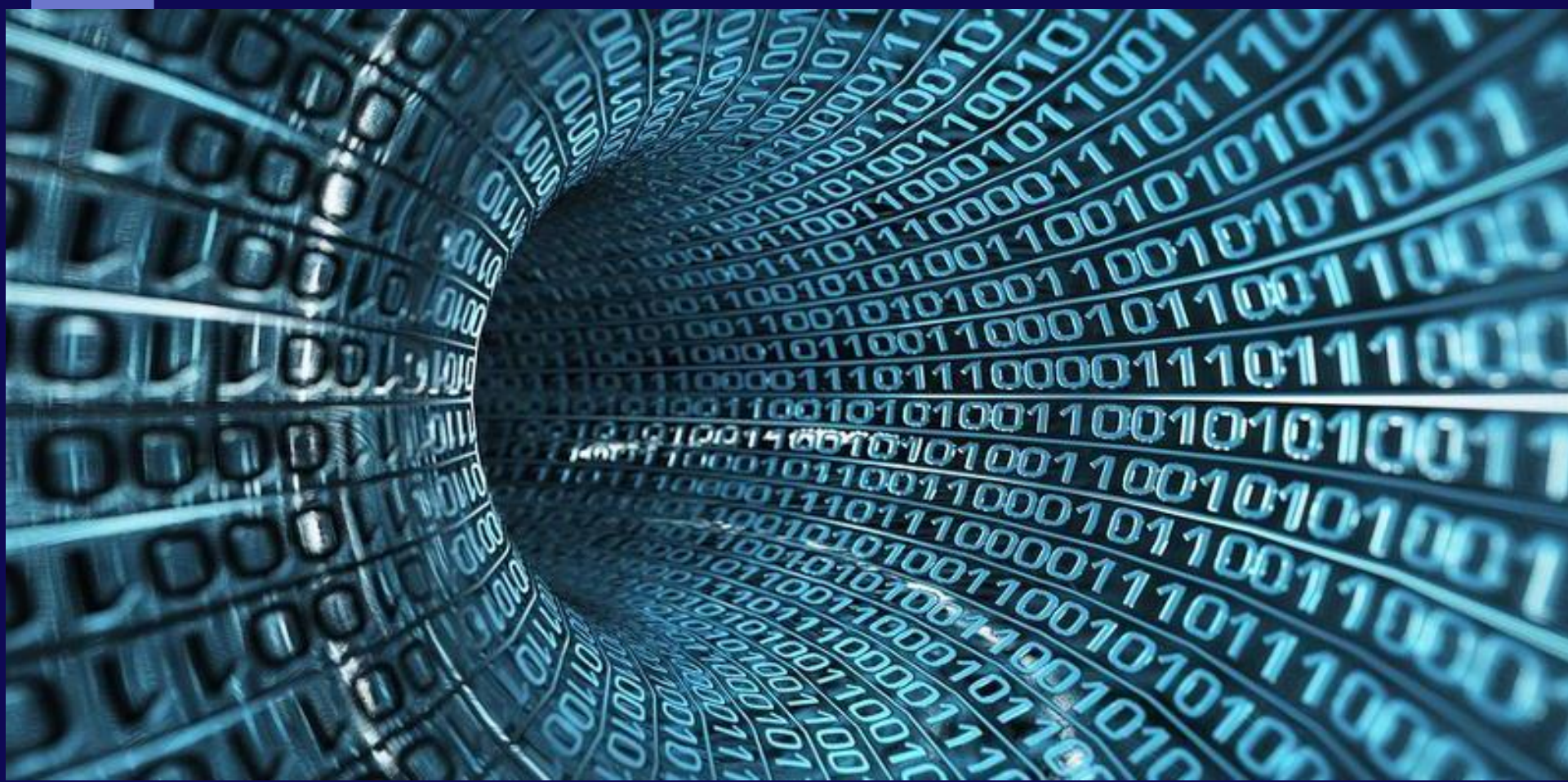
$$\frac{\partial Q}{\partial t} + \frac{\partial}{\partial x} \left(\frac{Q^2}{A} \right) + gA \frac{\partial h}{\partial x} - gAS_o + gAS_f = 0$$



- Formulation
- Implementation
- Primary Ops
- Extended Ops



BIG DATA



Data revolution:

Terra bytes Petabytes Exabytes ... Terra Hertz speed



WE NEED TO RE-TOOL OUR WATER EDUCATION SYSTEMS

- **GO BEYOND IWRM**
- **GO DIGITAL**
- **RE-INFORCE SYSTEM THINKING FROM DATA CAPTURING TO DISSEMINATION**
- **MAINSTREAM GOVERNANCE, INCLUDE SOCIAL AND POLITICAL SCIENCE COMPONENTS**
- **REDUCE THE GAP BETWEEN SCIENCE AND POLICY STUDIES**
- **GO TRANSDISCIPLINARY**

PREPARE FOR DIGITAL WATER MANAGEMENT AND INTEGRATED SYSTEMS (IoT, AI)

**WILL THERE BE ENOUGH
WATER FOR
THE HUMANS AND THE
ENVIRONMENT
IN THE 21ST CENTURY?**



YES, BUT

**WE NEED TO INVEST INTO
OUR EDUCATION SYSTEMS
NOW**





A CRISIS OF GOVERNANCE



WATER IS AN ETHICAL ISSUE

The challenge we all have

*How to put water in the minds
of people?*



FINAL MESSAGE:

“Anybody who can solve the problems of water will be worthy of two Nobel Prizes, one for peace and one for science.”

(President John. F. Kennedy)