

An aerial photograph of a wide river basin, likely the Yellow River in China. The river flows through a valley with green fields and some urban areas. In the foreground, a traditional Chinese pagoda with a multi-tiered, orange-tiled roof is visible on a hillside. The sky is overcast and hazy.

# **Difficulties in integrated river basin management**

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河南省鄭州市大觀園より見た黄河

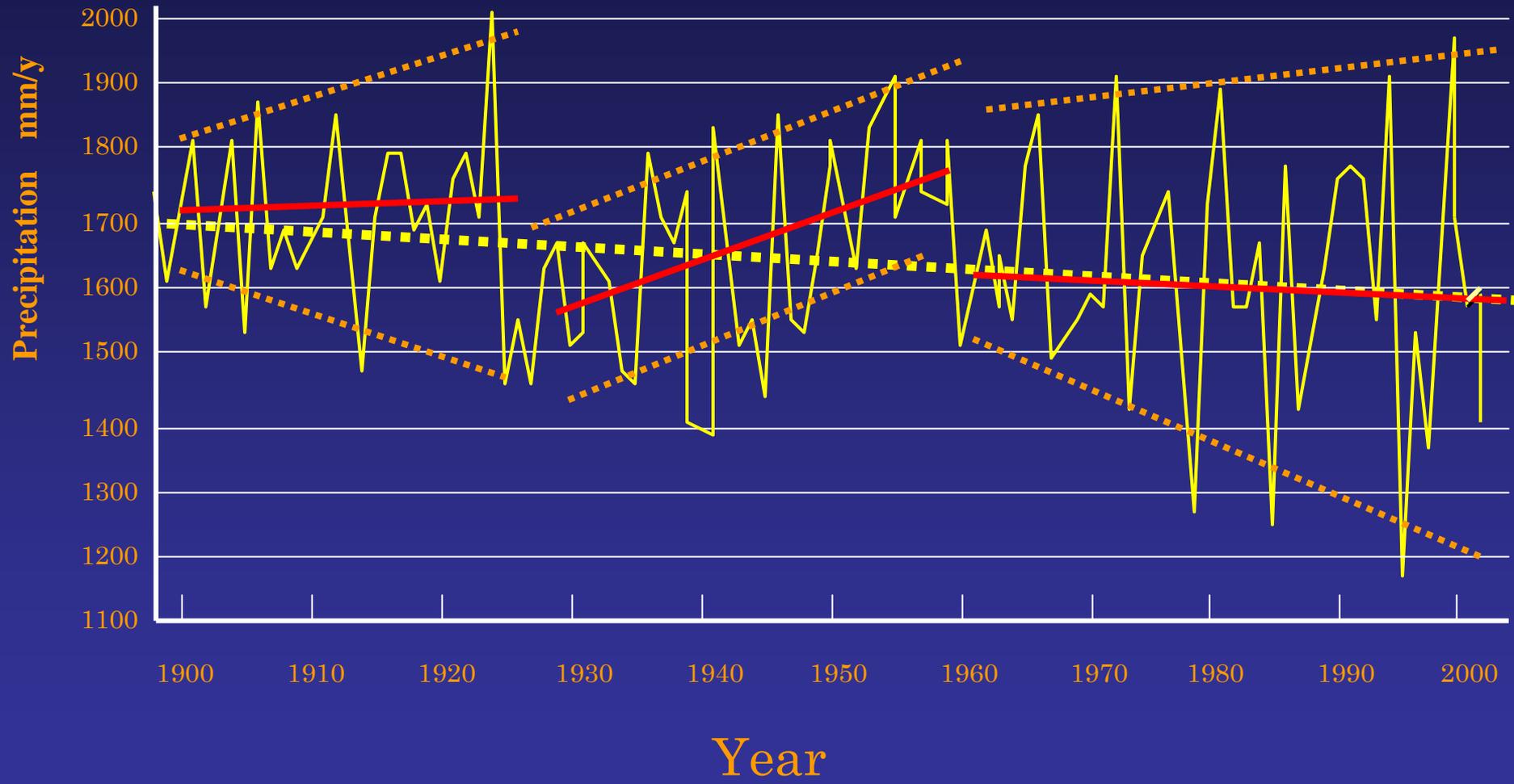
# 21<sup>st</sup> Century : Water Century

- Increasing water shortage
- Increasing fluctuation of precipitation
- Increasing conflicts on water resources distribution
- Deteriorating water quality
- Increasing mal-usage of water
- . . . . .



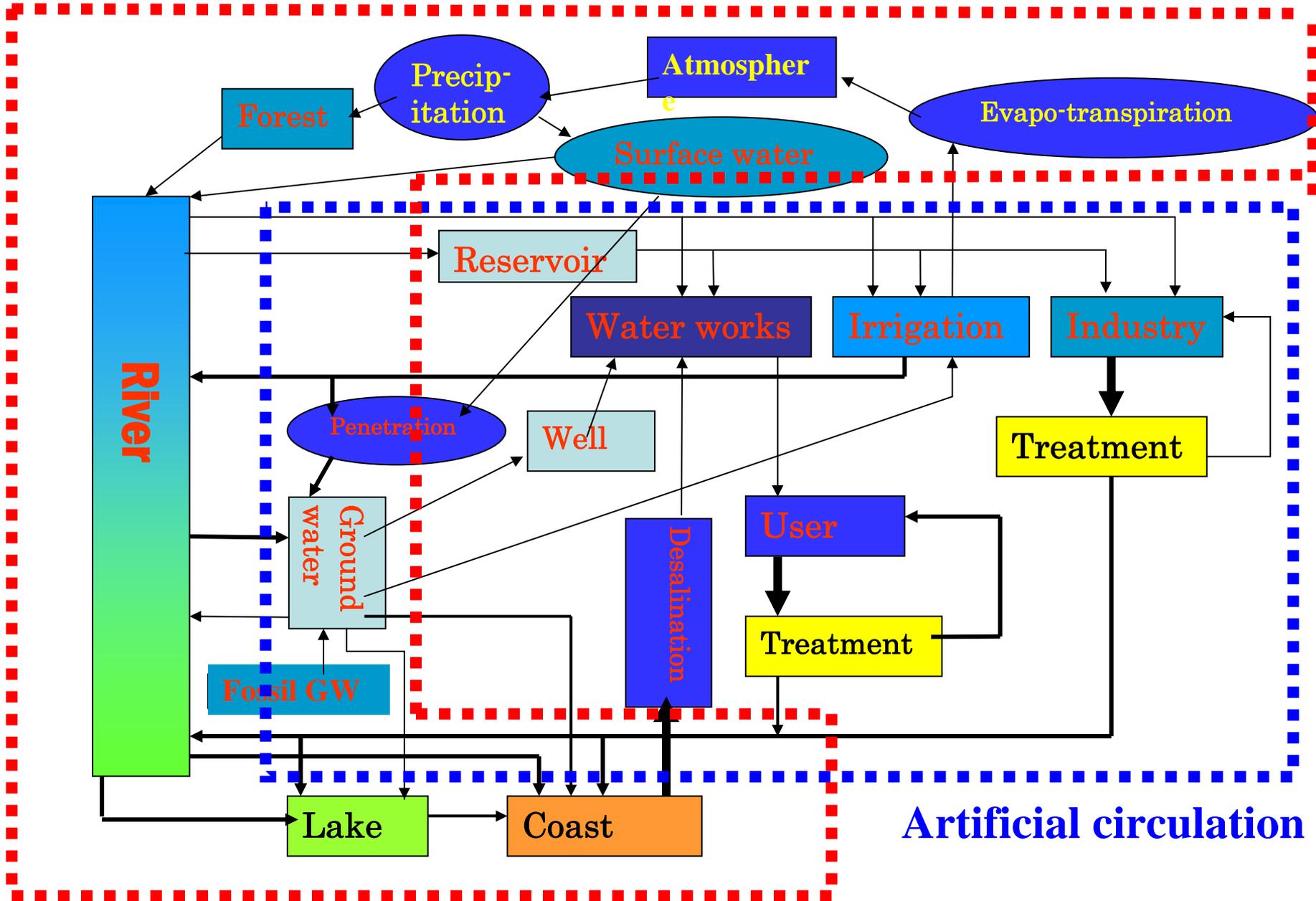
**Integrated river basin management**

# Annual precipitation in Japan



# Structure of the society

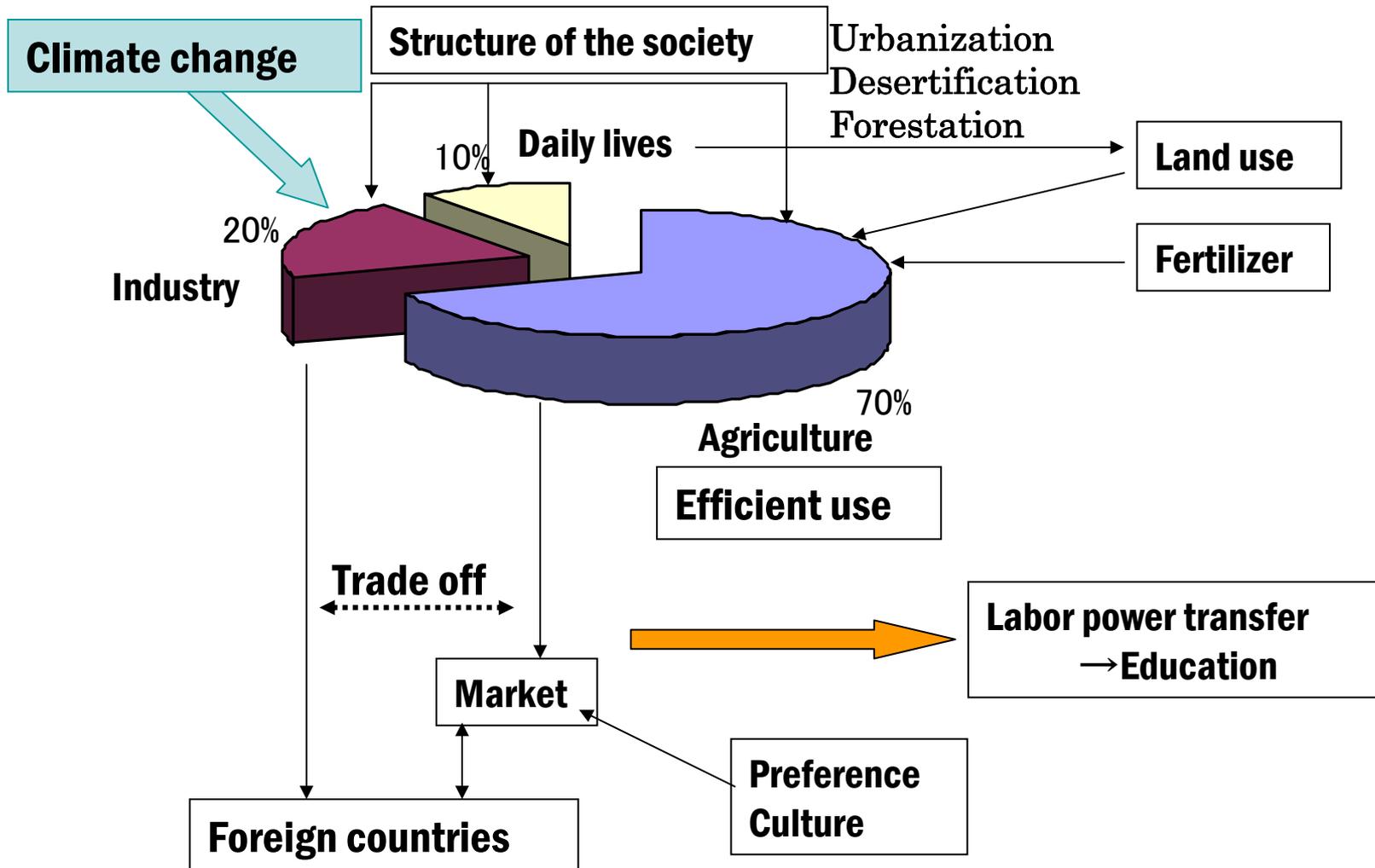
- **Water circulation; supply and treatment**
- **Energy supply**
- **Food supply**
- **Transportation**
- **Communication**
- **Education**
- **Medical care**
- **Industrial production**
- **Banking**
- **Finance**
- **Administration**
- **Judiciary**
- **Legislation**
- . . . . .



**Natural circulation**

**Artificial circulation**

# Subsystem: Agricultural production



## **Definition of river basin**

- **River basin:**

an area where precipitation is directly collected

- **Water utilization area:**

the area which uses water from the river basin

- **Economically influenced area:**

the area which receives influence from the river basin

# **Integrated river basin management**

**Making efforts to establish a subsystem of the society for  
flood control,  
water utilization, and  
environmental protection**

**With**

**the least cost,  
the least environmental loading,  
the least natural resources consumption, and  
the least risk under equity in the society including impacts toward  
outside of the river basin.**

# **The procedure of the integrated river basin management**

- 1) Establishing a target or targets**
- 2) Constructing strategy**
- 3) Setting tactics**
- 4) Operation**
- 5) Monitoring**
- 6) Feed-back**

# **Concept of the river basin management**

- 1) Explaining the water circulation by combining natural and artificial ones;**
- 2) Targeting water quality and quantity as well as water space (depth and surface width)**
- 3) Selecting a target or targets such as flood control, utilization, irrigation, fishery, daily lives, wild lives;**
- 4) Managing land use;**
- 5) Considering landscape, navigation, and recreation;**
- 6) Integrating concepts on managing organizations;**
- 7) Relating the basin with outer regions with virtual water and social relations; and finally,**
- 8) Maximizing social benefit and minimizing social complaints with social equity, less pollutant loading, less consumption of natural resources.**

# Items concerned with the river basin management

## 1) Locality

Precipitation changes locally.

## 2) Historical background on water utilization

Water resources are served on the first-arrive-first-serve base.  
Change of agriculture causes conflict against other users.

## 3) Economical priority

The sustenance of the life

→ The daily life

→ Industrial water

→ Agricultural and fishery water

## 4) Equity

Upstream-downstream problems

## **Items concerned with the river basin management 2**

### **5) Efficient use**

**Water saving**

**More production per unit volume of water**

### **6) Reduction of accidental and intentional risk on water supply**

**The risk on water : inundation, drought, and contamination**

**Intentional contamination by terrorism**

**Unintentional contamination by accidents**

### **7) Institution**

**Unification of the institution**

**Water right**

**Full cost pricing**

**Misconduct of the planning**

**EU directives**

## **Items concerned with the river basin management 3**

### **8) Psychology of residents**

Drinking reclaimed water

### **9) Gender**

Equity between man and woman

### **10) Information transfer**

Giving information to the residents

### **11) Energy saving**

Essential for sustainability

### **12) Transport**

Virtual water

## **Items concerned with the river basin management 4**

### **13) Protection of ecosystem**

Protecting biotope

Biodiversity is not requisite for one river

### **14) Side effects by introduction of technologies**

Reservoir construction

Chlorination of drinking water

### **15) Climate change**

Increasing fluctuation of rainfall

Early snow melt

### **16) Change of demands**

Changes of the structure of society

Decrease in population

## **Examples on difficulties for integrate river basin management**

- 1) Setting a target or targets for the management**
- 2) Setting boundary conditions for consideration  
on the integrated river basin management**
- 3) Transition management**
- 4) Instability of subsystems and elements**

## **Conclusion**

- **Integrated river basin management is a tool for sustainability.**
- **Procedures for developing IRBM should be developed.**
- **Transition management should be investigated.**

# 謝謝 Thank you

