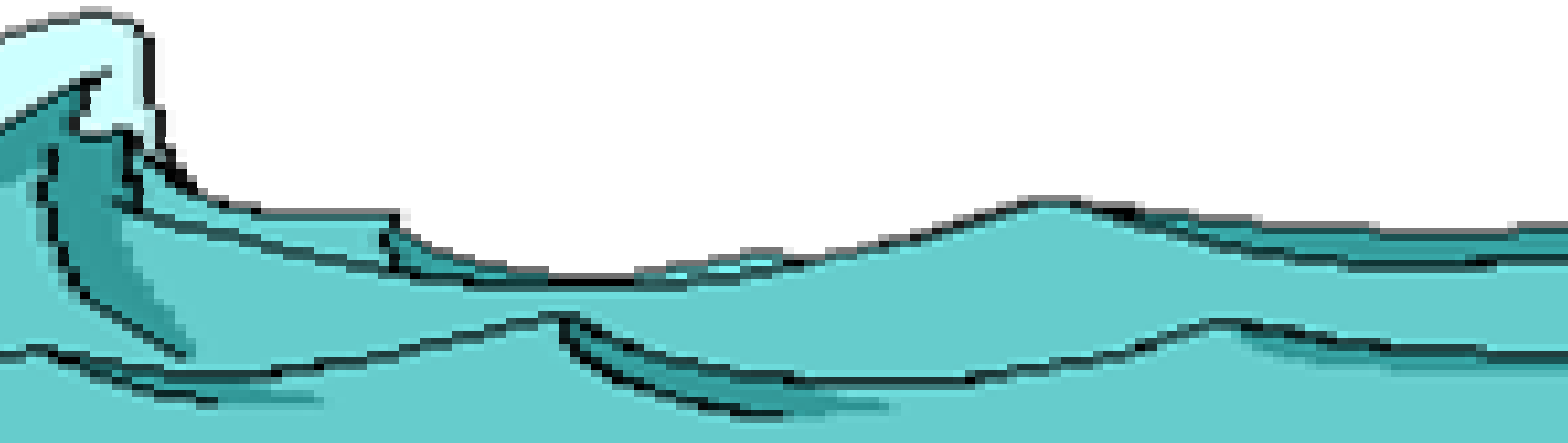


Water Resources

Naoko, Shun, Yoshi, Miki

Dec. 23, 2003



Focus of Study

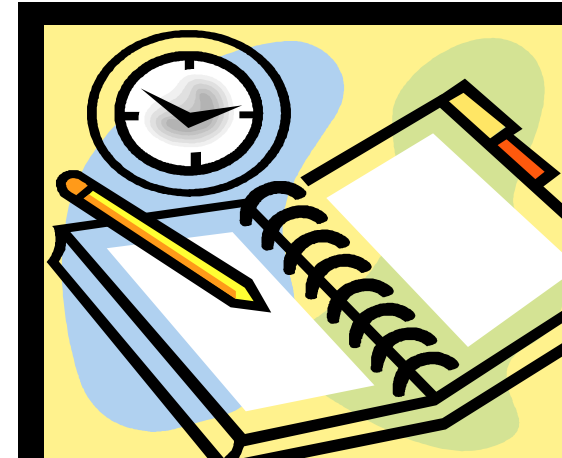
Economic measures that induce efficient water-use for agricultural water

**Economic tools are
key!**



Agenda

1. Impacts of Climate Change
2. Options of Water Management
3. Economic Measures
4. Considerations
5. Conclusion



It's quiz time!!



What is the percentage of
FRESH WATER on Earth?

A:

Answer is

D: 2.5%

C:

5%



D: 2.5%

How about fresh water
that is easy to use ?

A:

Answer is

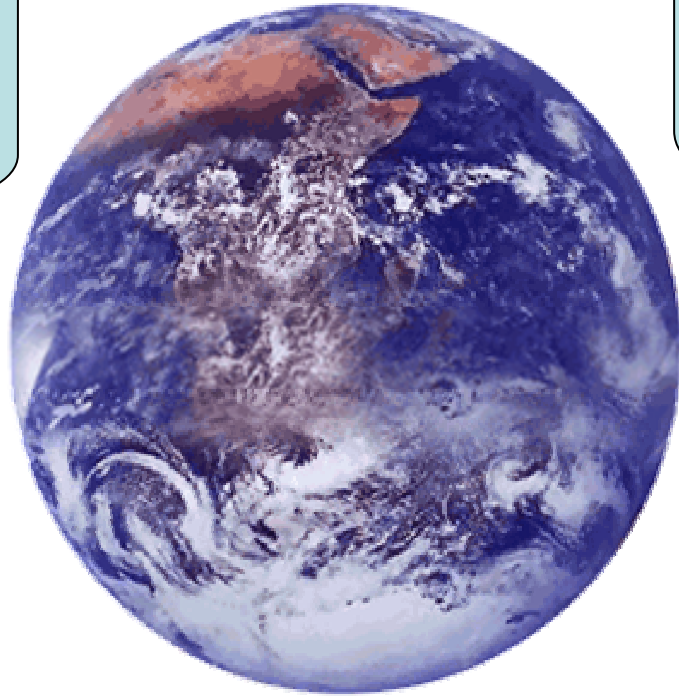
C: 0.8%

C: 0.8%



Facts and Figures on water

Fresh water
about **2.5%**



Seawater
about **97.5%**

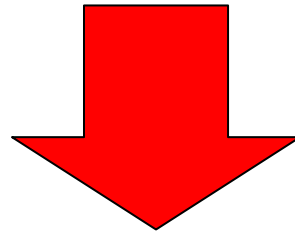
**We can easily use only 0.8% of
the water on Earth!!!**

1. Impacts of Climate Change

World

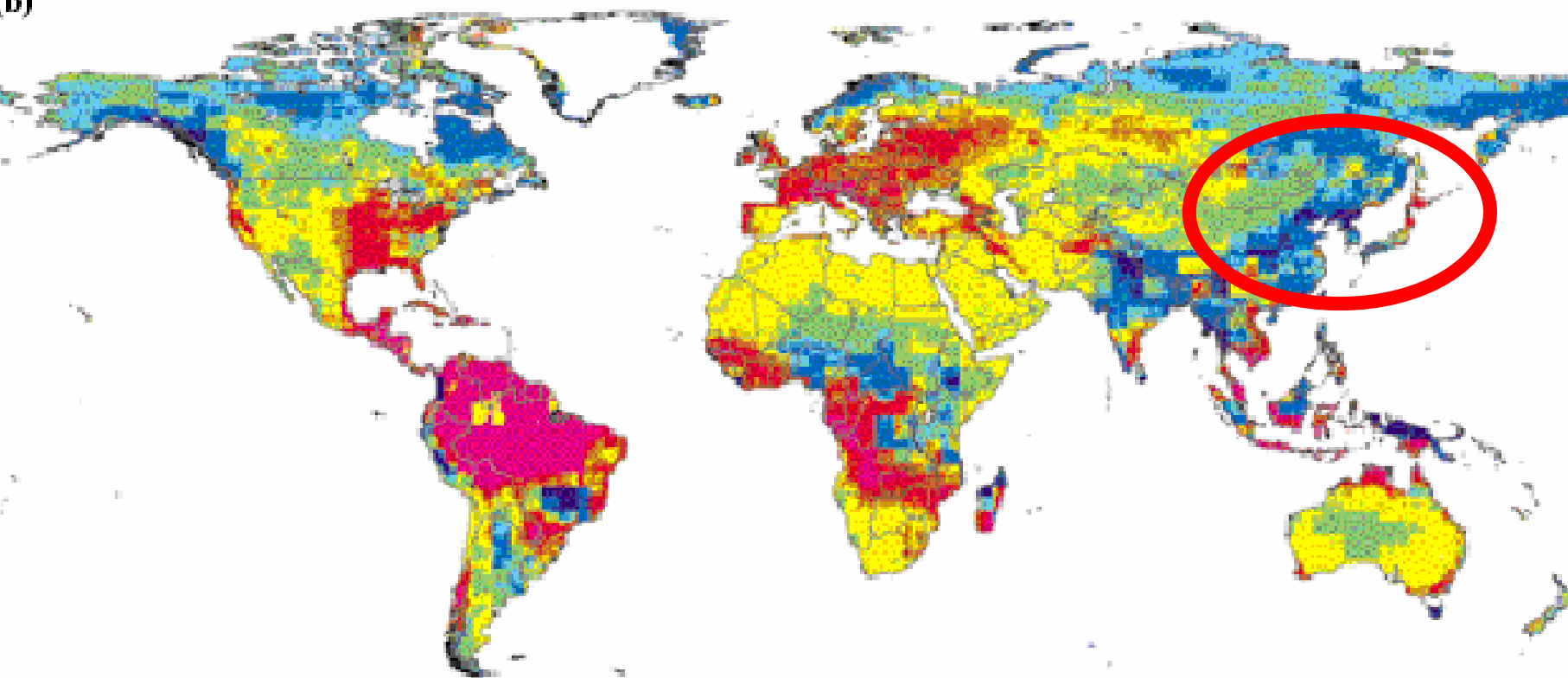
- *Temperature*

⇒ has increased about 0.6°C



evaporation & precipitation

(b)



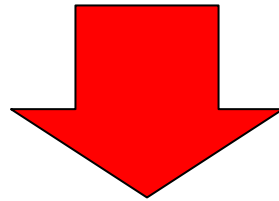
source: IPCC Third Assessment Report "Climate Change 2001"

1. Impacts of Climate Change

Japan

■ *Temperature*

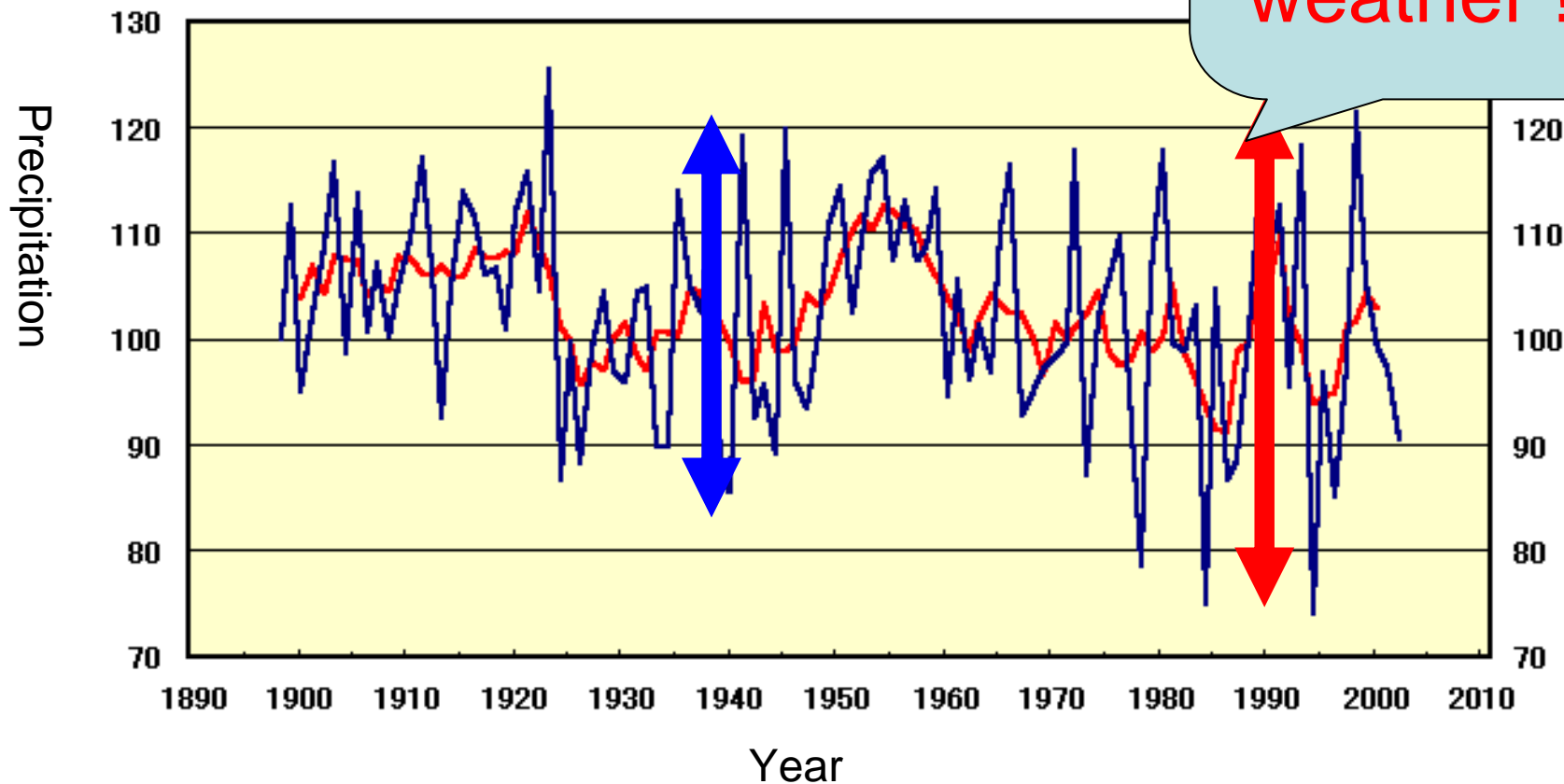
⇒ has increased about 1.0°C



evaporation & precipitation will increase

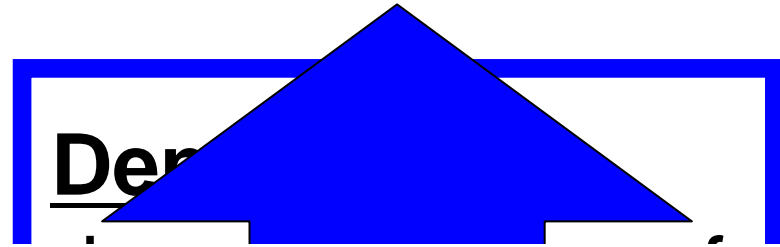
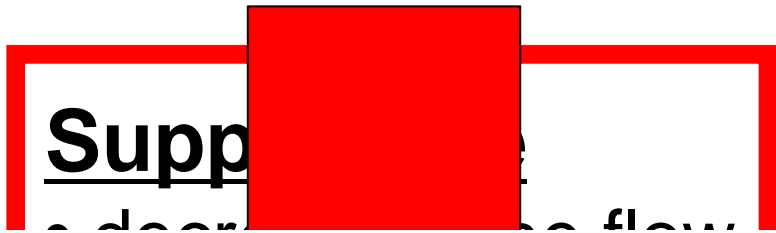
The Change in Precipitation in

This should be the reason for
**abnormal
weather !!**

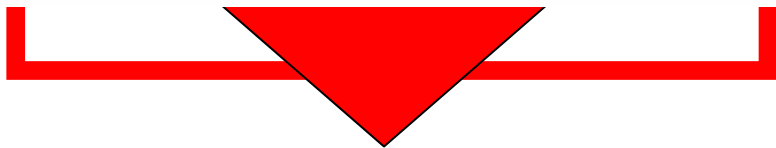


source: Japan Meteorological Agency

Prospect in Japan

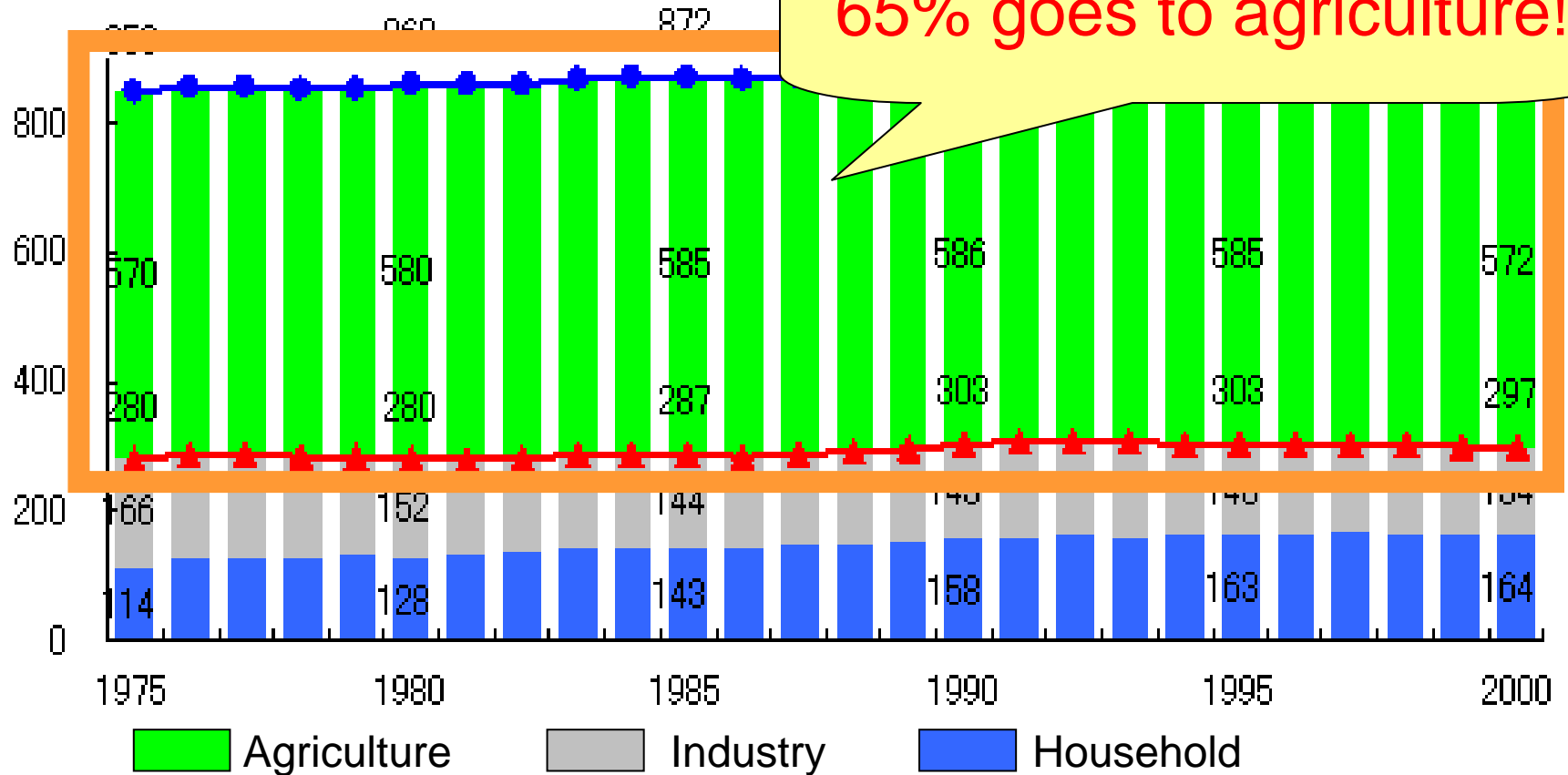


Water supply and demand will be tight!!



Water use in Japan

One hundred million / m³

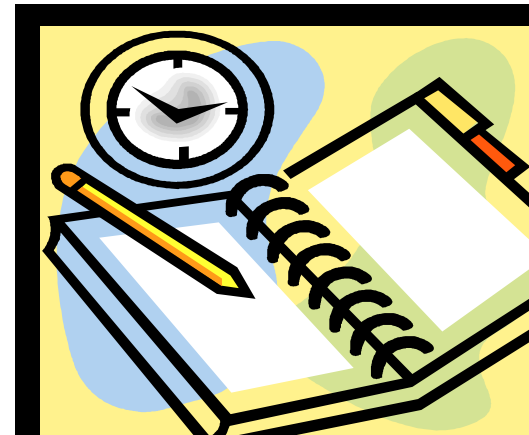


65% goes to agriculture!

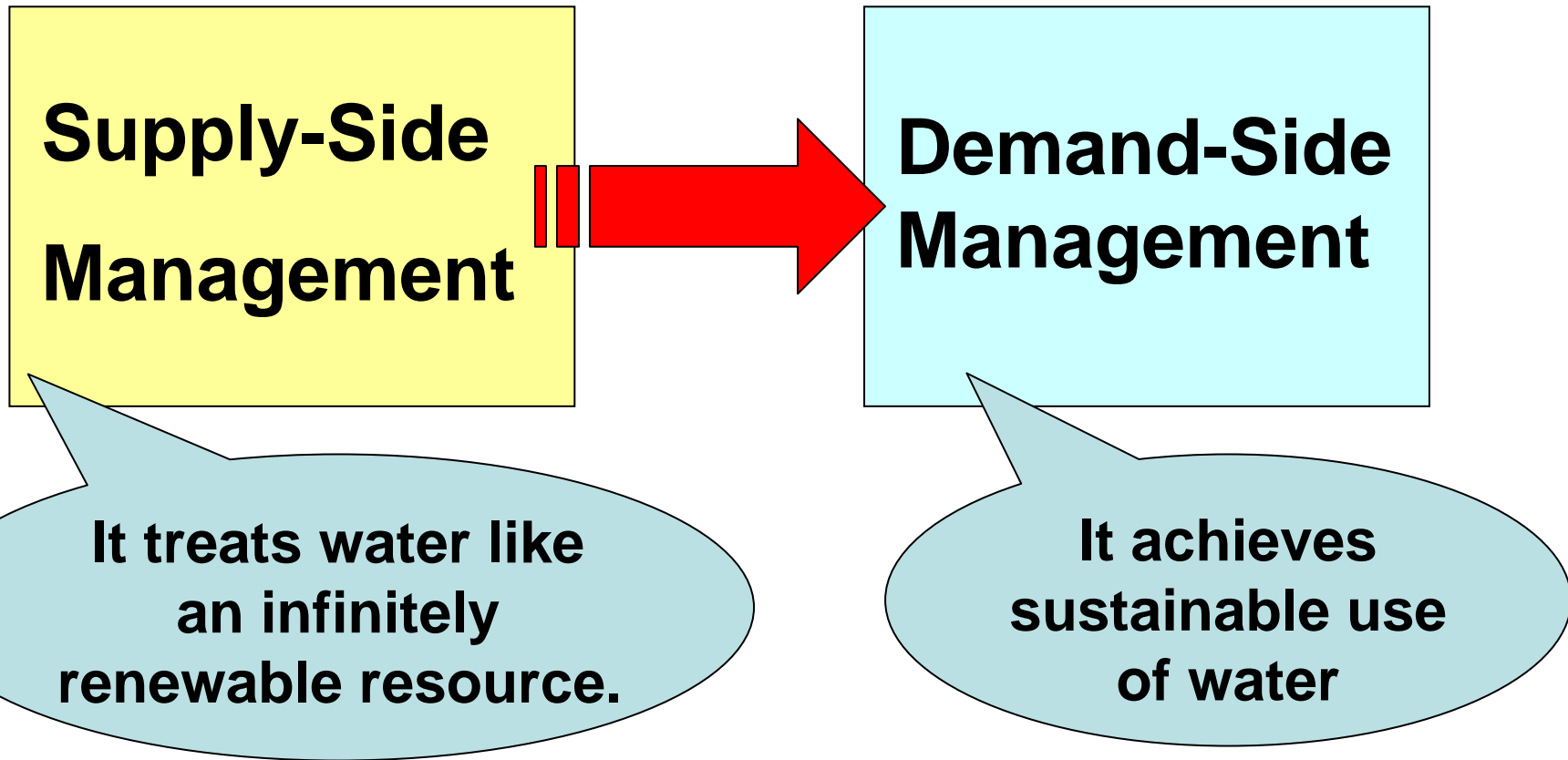
Source: Ministry of Land, Infrastructure and Transportation

Agenda

1. Impacts of Climate Change
2. Options for Water Management
3. Economic Measures
4. Considerations
5. Conclusion



2. Options of Water Management



Socio-economic Factors

Demand Side Management

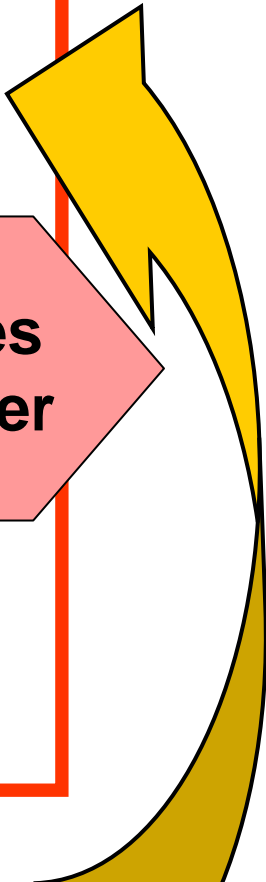
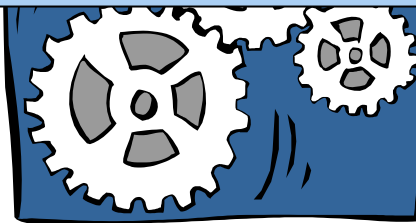
Economic
measures

**Financial incentives
for the user of water**



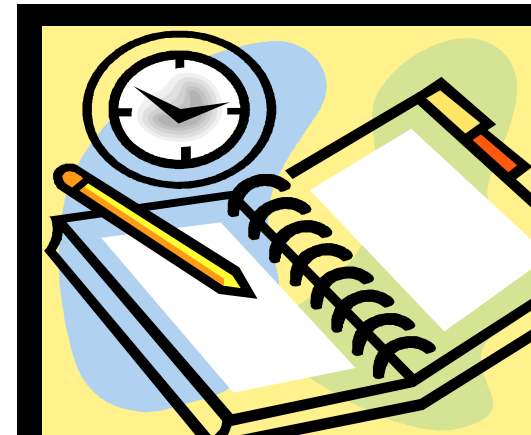
Technological
measures

**Water-saving
technology**



Agenda

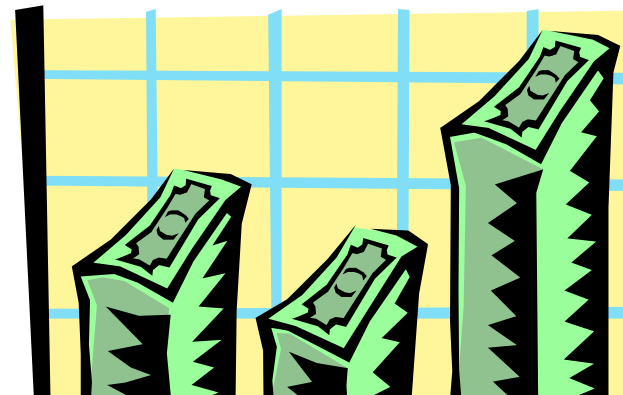
1. Impacts of Climate Change
2. Water Management
3. Economic Measures
4. Considerations
5. Conclusion



3-1 Evolution in the international community

*“...water has an economic value in all its competing uses and should be recognized as an **economic good**”*

Dublin Statement Principle 4 (1992)



*Consideration should be given to the gradual implementation of **pricing policies** that are geared towards cost recovery and the equitable and efficient allocation of water, including the **promotion of conservation.***”

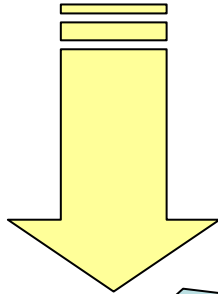
United Nations 1997

*...countries are moving towards water pricing schedules that ... help provide **incentives for efficient water use** and generate funds for necessary infrastructure development and expansion.”*

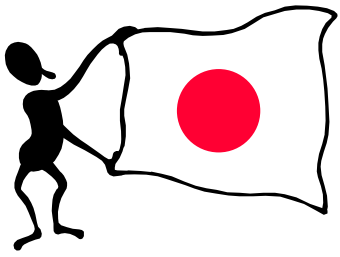
OECD 2003

3-2 Economic Measures

- ① Area-pricing
- ② Volumetric pricing
- ③ Trading of water rights



incentives for efficient water-use



Present situation in Japan

Pricing

→ Area-pricing

Trading

→ no market

3-3 Measures for efficient water-use

(A) Volumetric pricing

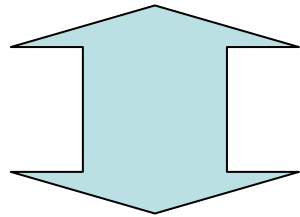
(B) Trading of Water rights

(A) Volumetric Pricing

Volumetric pricing

= pricing by the amount of water

⇒ gives incentive for efficient use

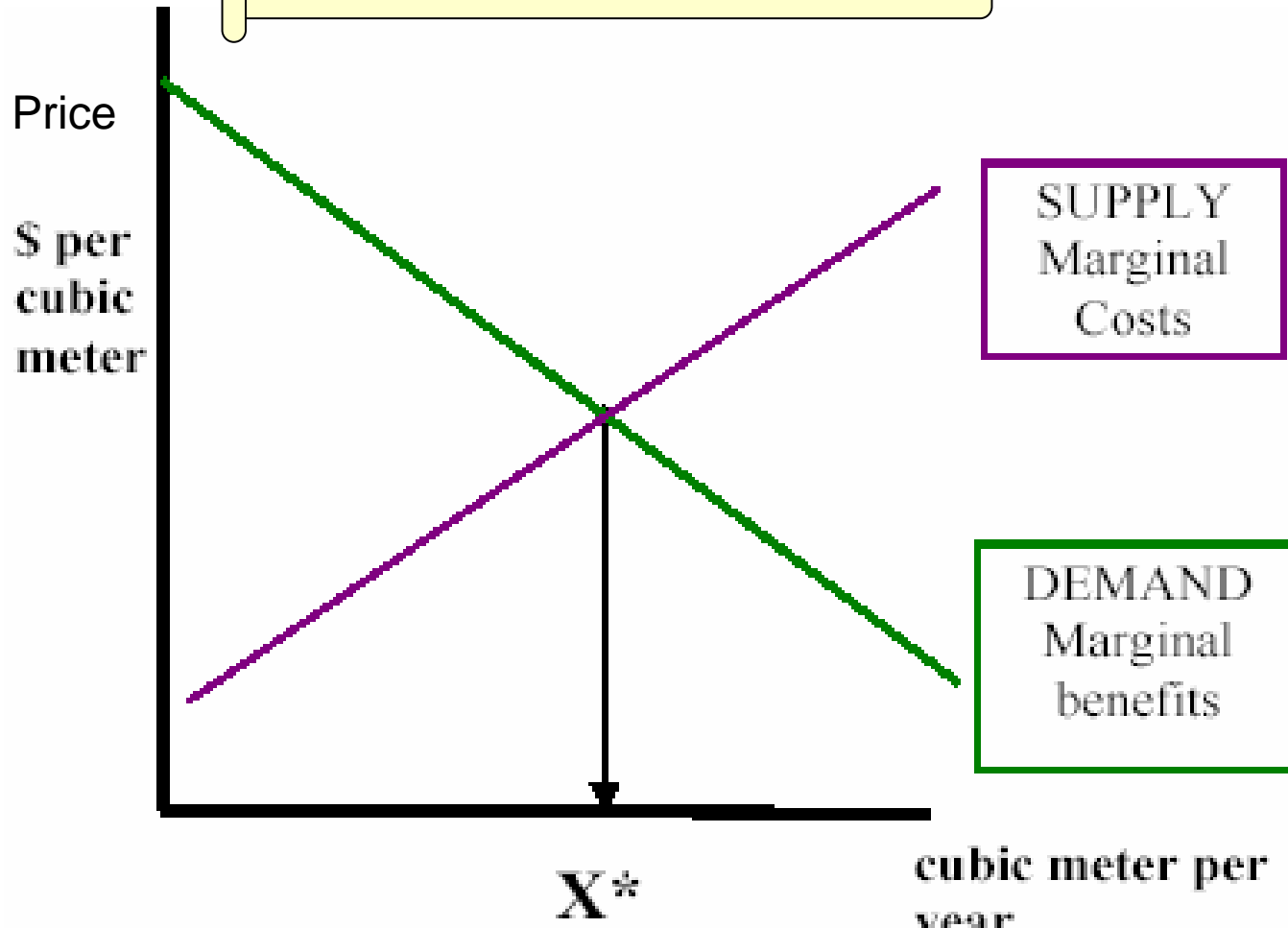


Area-pricing

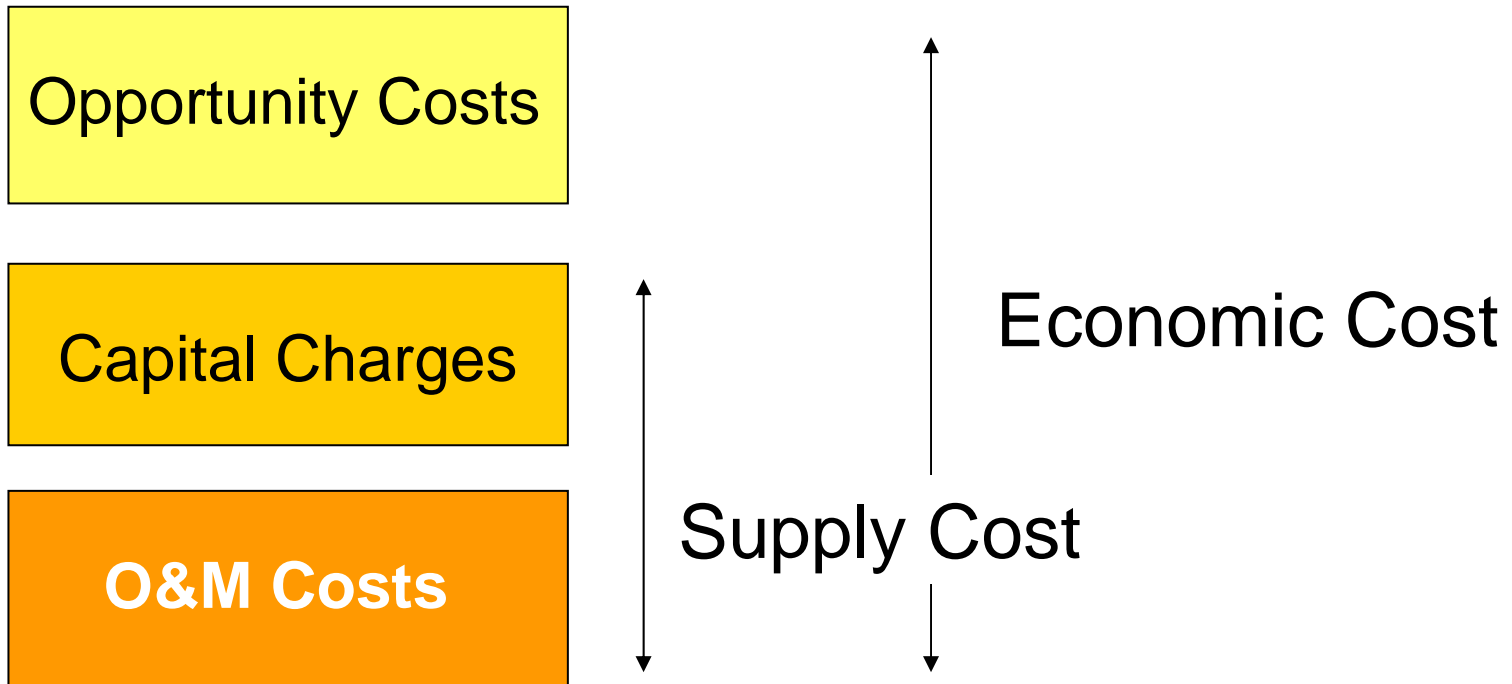
= pricing by acreage

⇒ no incentive for efficient use

Classic Economic Model



Price of Water



Opportunity Costs

address the fact that by consuming water, the user is depriving another user of the water

Capital Charges

capital consumption, interest costs

O&M Costs

costs associated with the daily running of the supply system

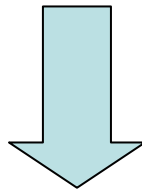
3-3 Measures for efficient water-use

(A) Volumetric pricing

(B) Trading of Water rights

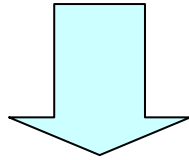
(B) Trading of Water rights

Arrangement in which **holders of water rights trade them** with each other or to outside parties.



It increases the **efficiency of water use** and allocation within and among sectors.

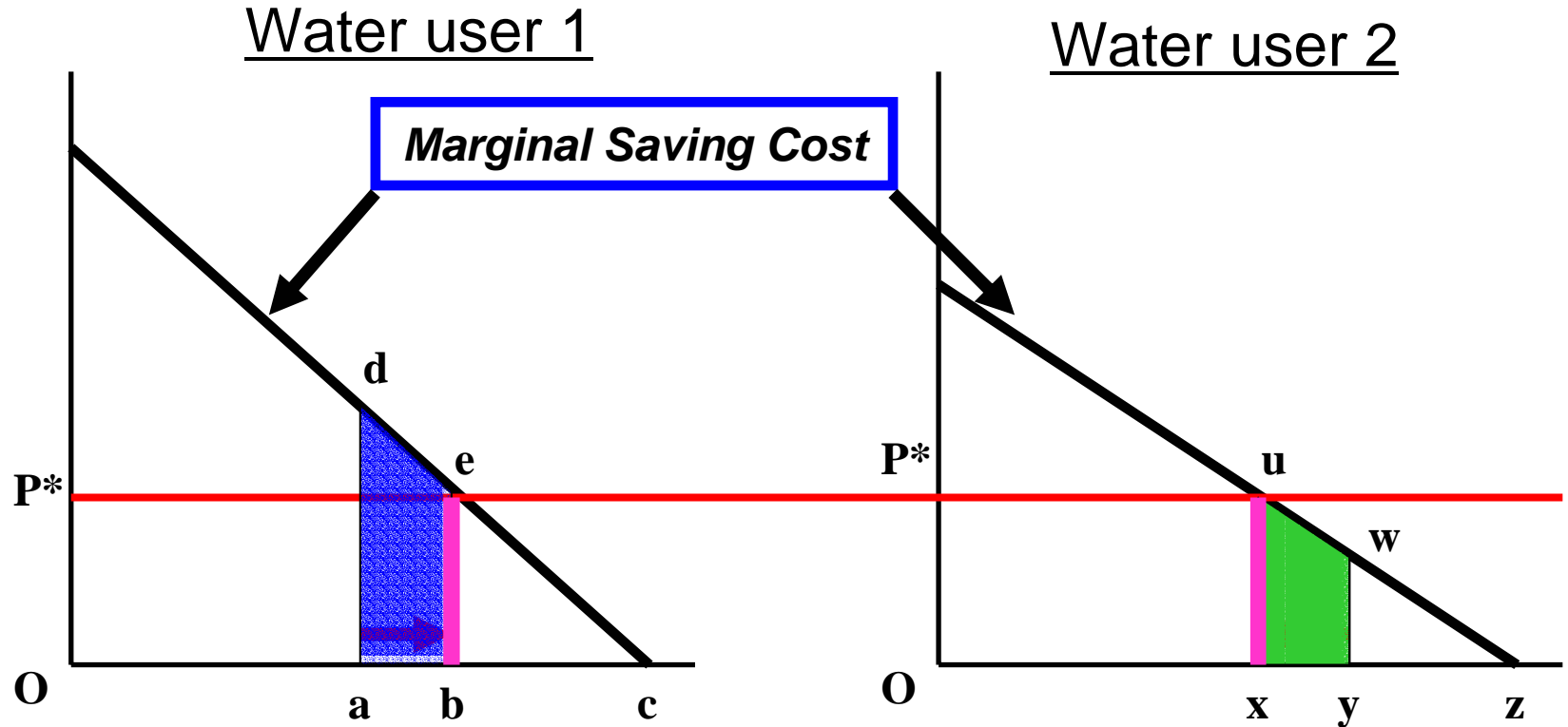
- Allocation of tradable water rights to water users.



- transactions between the higher productive and the lower productive will equalize marginal saving costs of all participants.

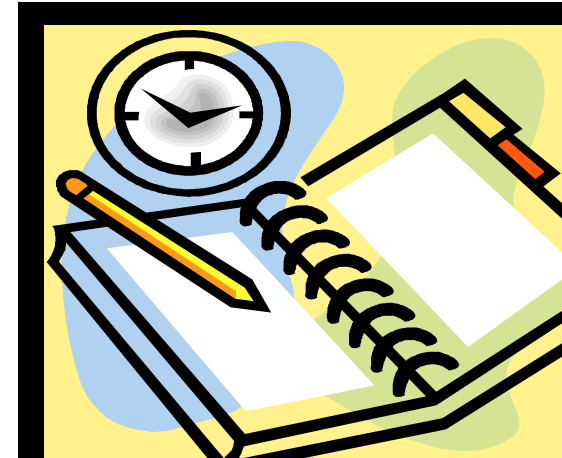
It's Examination Time!

Mechanism of Tradable Water Rights



Agenda

1. Impacts of Climate Change
2. Water Management
3. Economic Measures
4. Considerations
5. Conclusion



4. Considerations

(A) Volumetric pricing

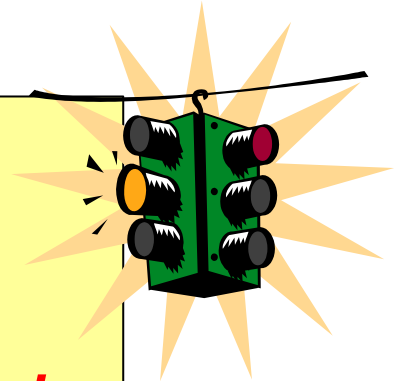
PROS: incentive for **efficient use**

CONS: implementation costs for metering

★ Japan → metering is not standardized

Study done by Tsar and Dinar:

If the cost of applying volumetric pricing techniques exceeds 10 percent of the revenues collected through charges, **simple area pricing maybe more efficient.**

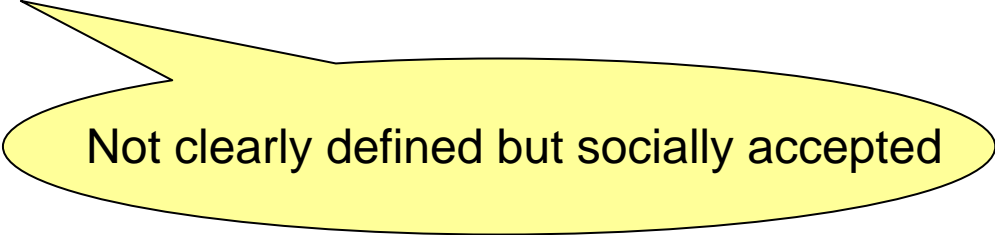


(B) Trading of Water rights

PROS: incentive for **efficient use**

CONS: establishment & allocation of tradable water rights,
metering costs

★ Japan → Historical rights & Legal rights



Not clearly defined but socially accepted

If volumetric water metering and tradable water rights are established, economic instruments that promote efficient agricultural water-use can be used in Japan.

Environmental Externalities

Difficult to value

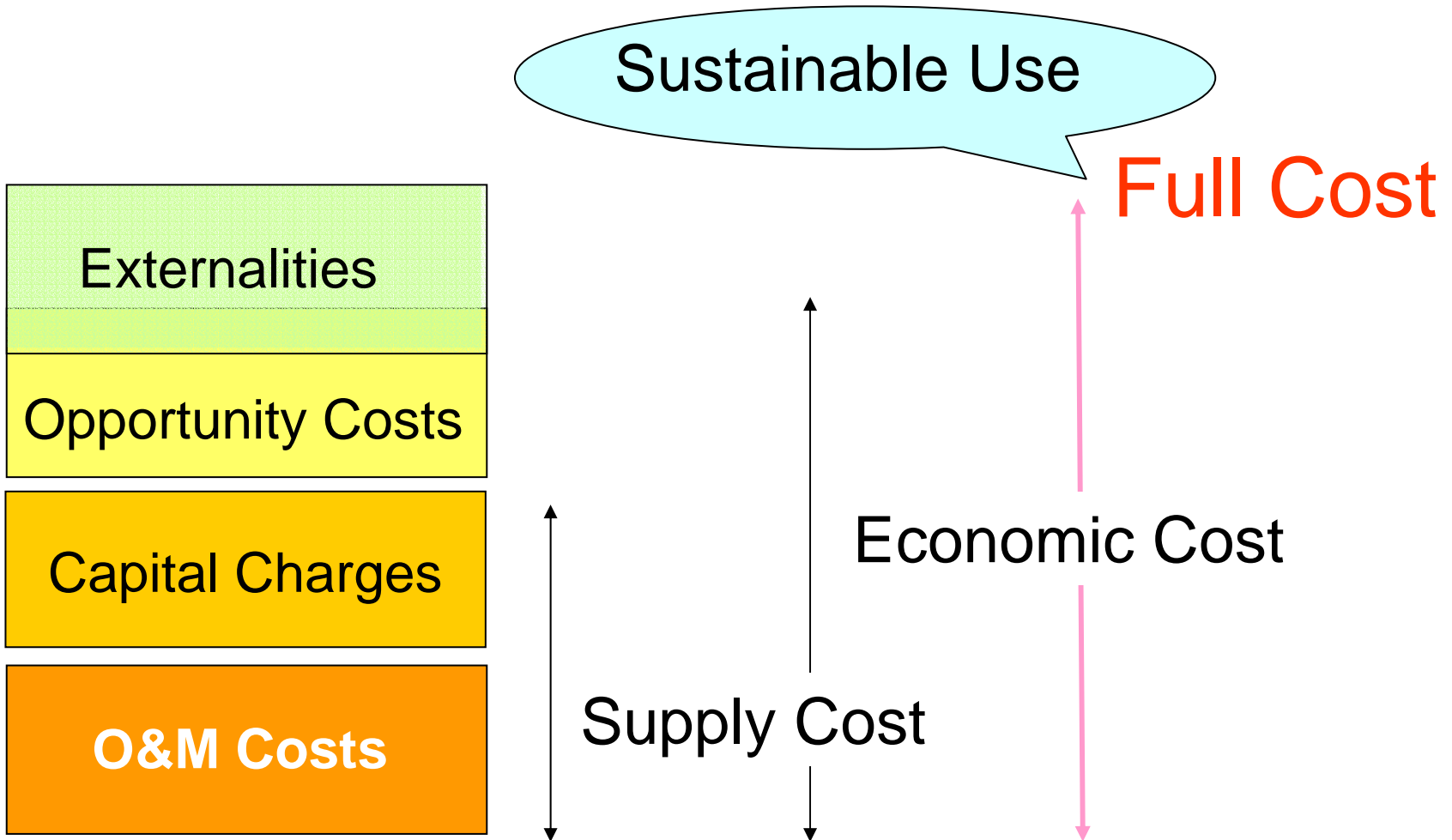
Negative

pollution, salinity

Positive

recharging groundwater aquifer,
creating landscape, biodiversity

Price of Water



5. Conclusion

*Japan should consider using **economic instruments** that induce efficient water-use for agricultural water. In order to do so, implementation of **metering costs** should be valued as well as the externalities involved with agriculture.*

References

- Dinar, Ariel (2000) "The Political Economy of Water Pricing Reform"
Economist (2003) "Survey: Water" July 17th Print Edition"
IPCC (2001) "IPCC Third Assessment Report "Climate Change 2001:
Impacts, Adaptation and Vulnerability"
OECD (2003) "Improving Water Management, Recent OECD Experience"
OECD (2001) "Transition to Full-Cost Pricing of Irrigation Water
for Agriculture in OECD Countries"
OECD (1999a) "Agricultural Water Pricing in OECD Countries"
OECD (1999b) "The Price of Water, Trends in OECD Countries"
Perry, C.J., Rock, Michael, Seckler, D. (1997)
"Water as an Economic Good: A Solution, or a Problem?"
International Irrigation Management Institute
Rogers, P., Bhatia, R., Huber, A. (1998)
"Water as a Social and Economic Good: How to Put the Principle into Practice"
Global Water Partnership Technical Advisory Committee

URL

- The Ministry of Land, Infrastructure and Transportation <http://www.mlit.go.jp/>
The World Bank <http://rru.worldbank.org/Resources.asp?results=true&stopicids=54>
The Ministry of Agriculture, Forestry and Fisheries <http://www.maff.go.jp/>

THE END

Thank you !!

fin