

Who determines the demand for food and who manages water?

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and SOAS London

Hydrological Society of South Australia & AARES
Water & the South Australian Economy
16 July 2013 Waite Campus

Who will deliver water security - **FAO**

Farmers will save the world

Accountants will save the world

Optimists will save the world

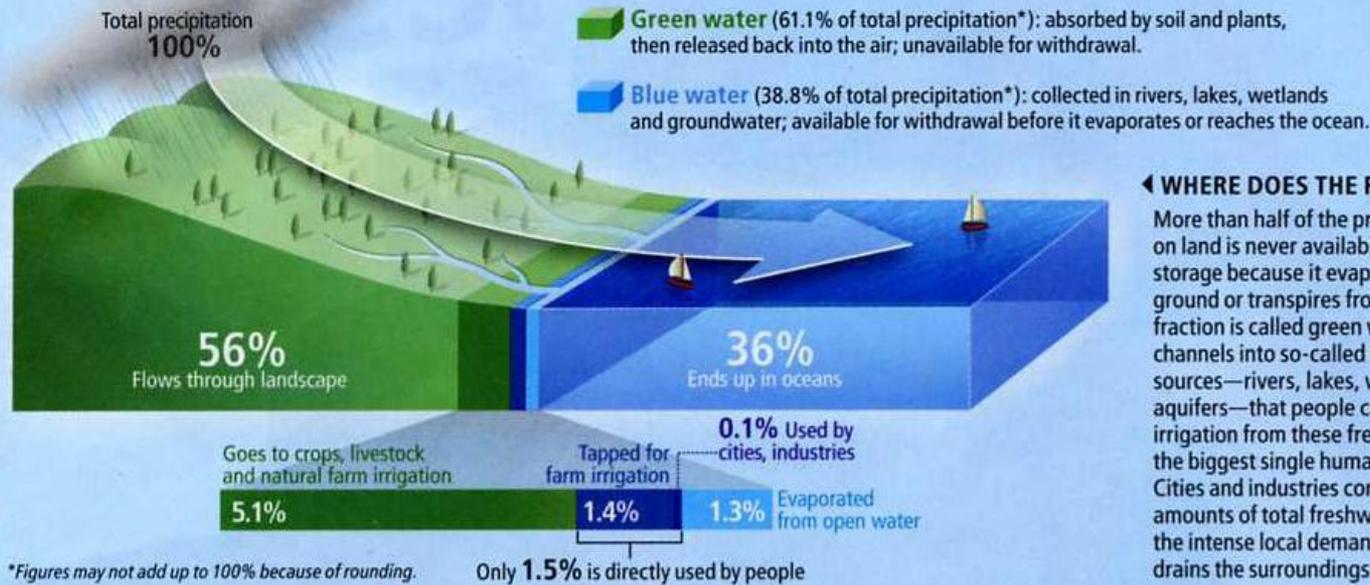
Some very important water ideas

Nature supplies

Green water **70%** Blue water **30%**

Lots of Water, but Not Always Where It Is Needed

One hundred and ten thousand cubic kilometers of precipitation, nearly 10 times the volume of Lake Superior, falls from the sky onto the earth's land surface every year. This huge quantity would be enough to easily fulfill the requirements of everyone on the planet if the water arrived where and when people needed it. But much of it cannot be captured (*top*), and the rest is distributed unevenly (*bottom*).

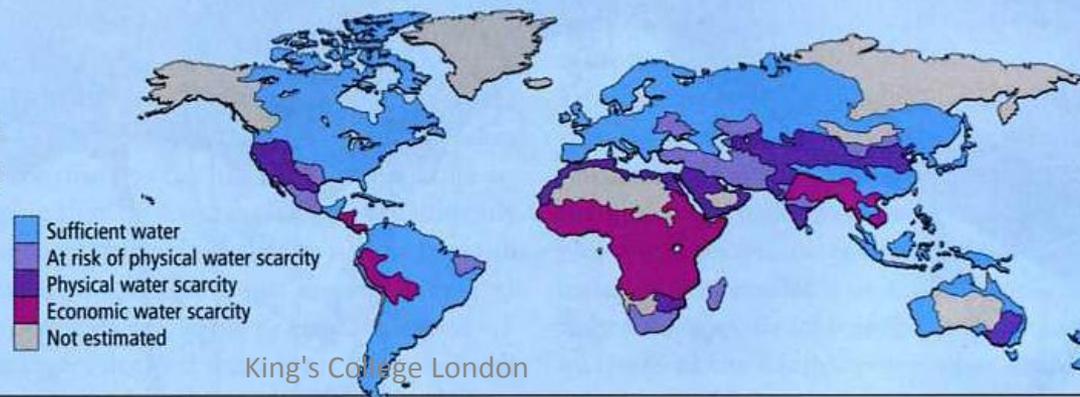


◀ WHERE DOES THE RAIN GO?

More than half of the precipitation that falls on land is never available for capture or storage because it evaporates from the ground or transpires from plants; this fraction is called green water. The remainder channels into so-called blue-water sources—rivers, lakes, wetlands and aquifers—that people can tap directly. Farm irrigation from these free-flowing bodies is the biggest single human use of freshwater. Cities and industries consume only tiny amounts of total freshwater resources, but the intense local demand they create often drains the surroundings of ready supplies.

WATER SUPPLIES TODAY ▶

Much of the Americas and northern Eurasia enjoy abundant water supplies. But several regions are beset by greater or lesser degrees of "physical" scarcity—whereby demand exceeds local availability. Other areas, among them Central Africa, parts of the Indian subcontinent and Southeast Asia, contend with "economic" water scarcity, where lack of technical training, bad governments or weak finances limit access even though sufficient supplies are available.



Some very important water ideas

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Society & its economies consume

Food-water **90%** Non-food water **10%**

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Other concepts –

Virtual water, Water footprints, Water science & Food supply chains

TYPES OF >> SCIENCE	Empirical–analytic inquiry	Interpretive inquiry	Liberatory Inquiry (e.g. Participatory Research)
Purpose	Experimental science in search of causal explanations and laws in order to make predictions	Interpretive science in search of subjective meanings and understanding in the world of lived experience.	Liberating (Humanising) science to create movement for personal and social transformation in order to redress injustices, support peace and form democratic spaces.
Nature of reality	A unique, real, social world exists to be studied by independent observers. Recognition is given to distinct, positive facts and observable phenomena	Pluralistic and relativist (multiple realities dependent on individual’s perceptions). People make purposeful acts based on their perceptions of feelings and events and so shape their realities by their behaviour.	The social world is humanly and collectively constructed with and within a historical context. People are active subjects in the world and are constantly in relationships of power: with the self, with others, with nature.
Nature of Knowledge	Objective truth exists. Objectivity (detached neutrality) and value-free science is possible and desirable. Logical, deductive, rational findings. Knowledge is an end in itself.	Knowledge is a social, subjective construction. Language contextualises the meaning of data. The method used justifies the knowledge produced.	People can change their level of consciousness through learning. Objectivity does not exist. Fundamental human needs drive the process of inquiry. Holistic dimensions of knowing.
Know’Produc’d	Technical instrumental	Interpretive Interactive	Critical, Spiritual
Values reflected	Deterministic application:. Concerned with ‘maintenance of evolutionary change of status quo’. Control over behaviour & environment	Humanistic application: ‘growth metaphor with self-actualisation of individuals within meritocratic forms of social life.	Transformative process. Belief in people’s capacity to work together for equitable decision-making and fair distribution of resources.

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Conceptualising trajectories of secure & sustainable water use

defined by

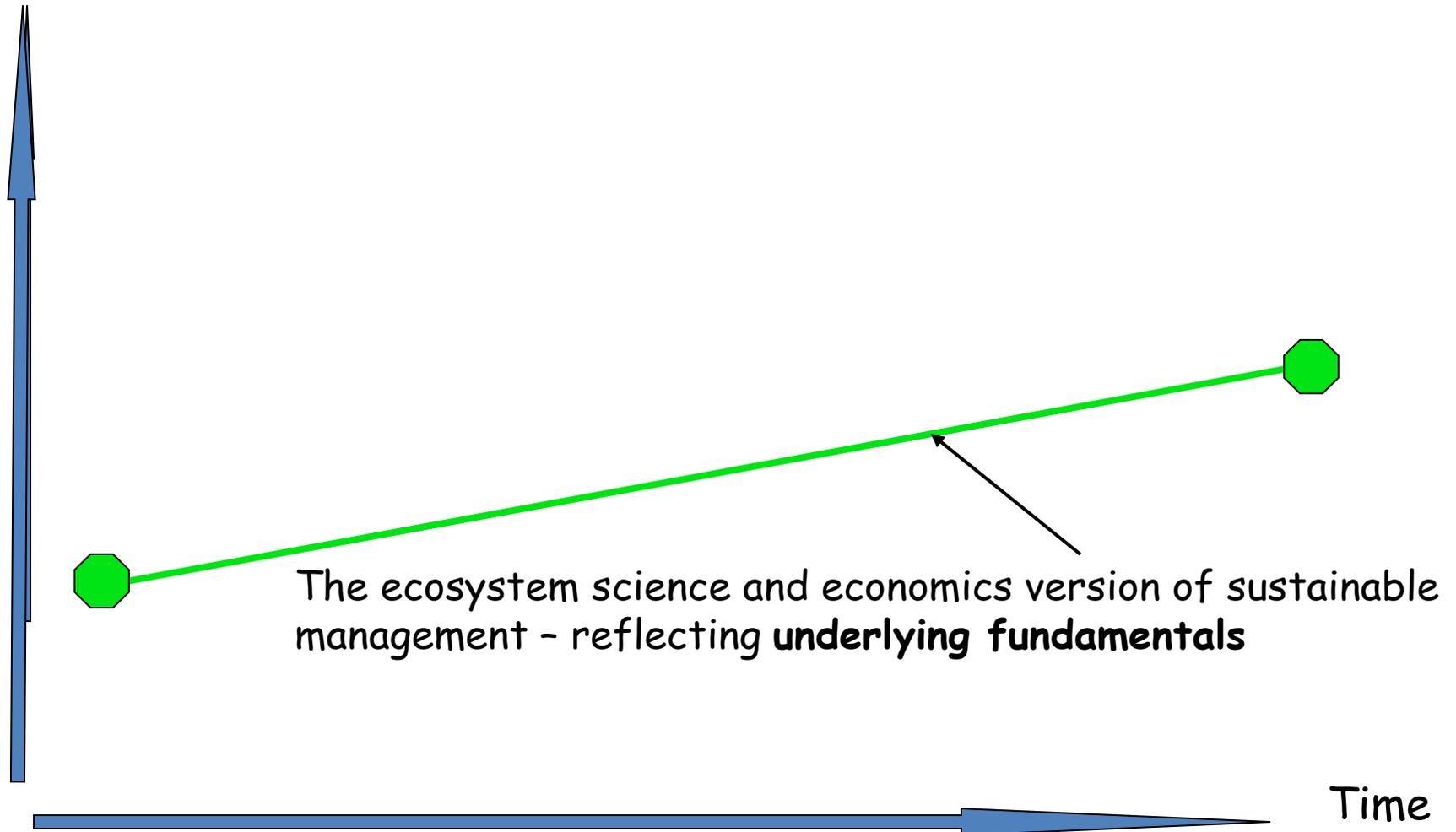
Society and water managing professionals
and policy-makers
- POLITICAL PROCESSES

Ecosystem scientists and economists
- UNDERLYING FUNDAMENTALS

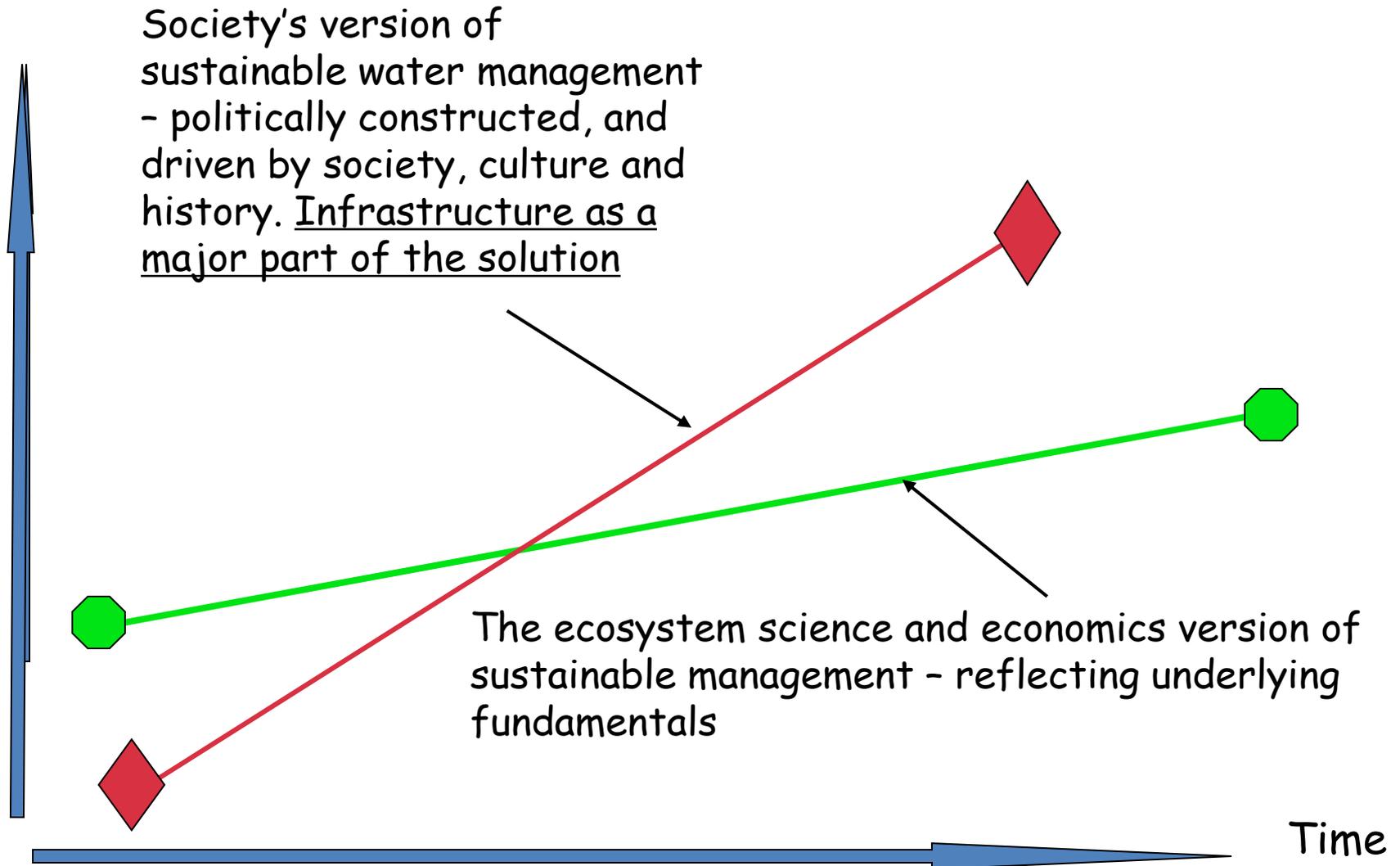
Water
resource use



Water resource use

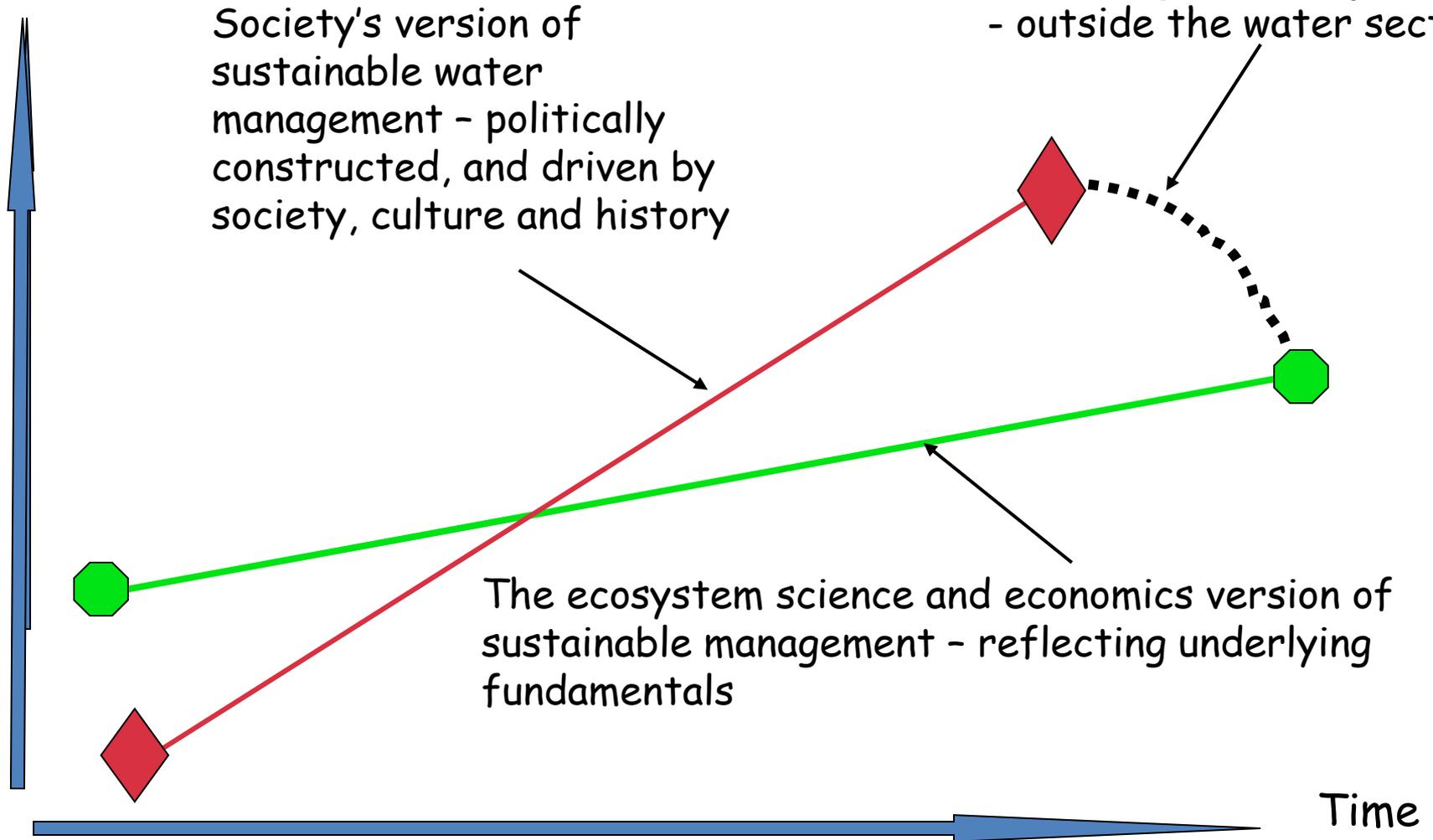


Water resource use



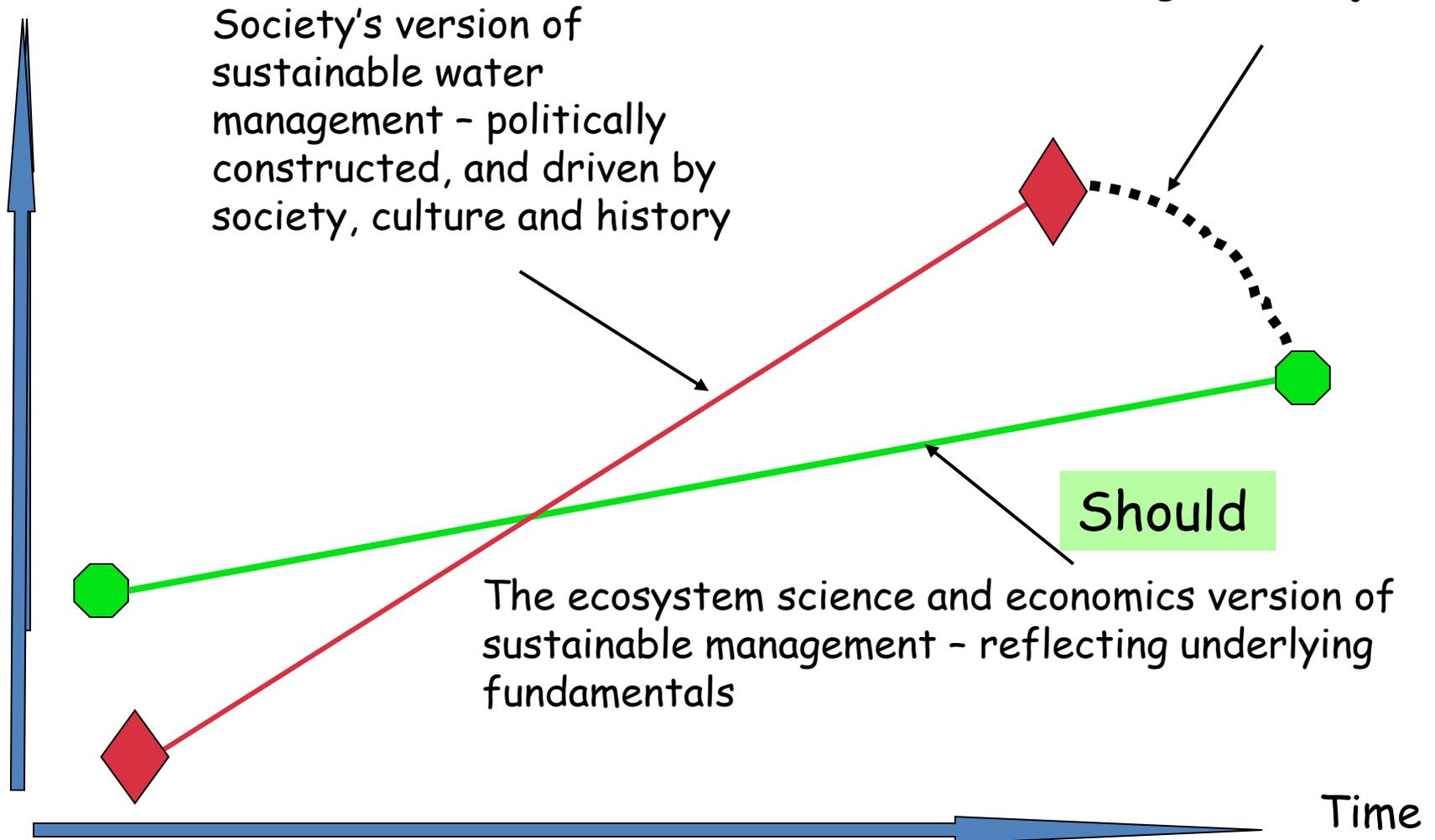
Water
resource use

The discursive political process that
could lead to the convergence of the
trajectories. Socio-economic
development & politics are the means
that change the trajectory
- outside the water sector



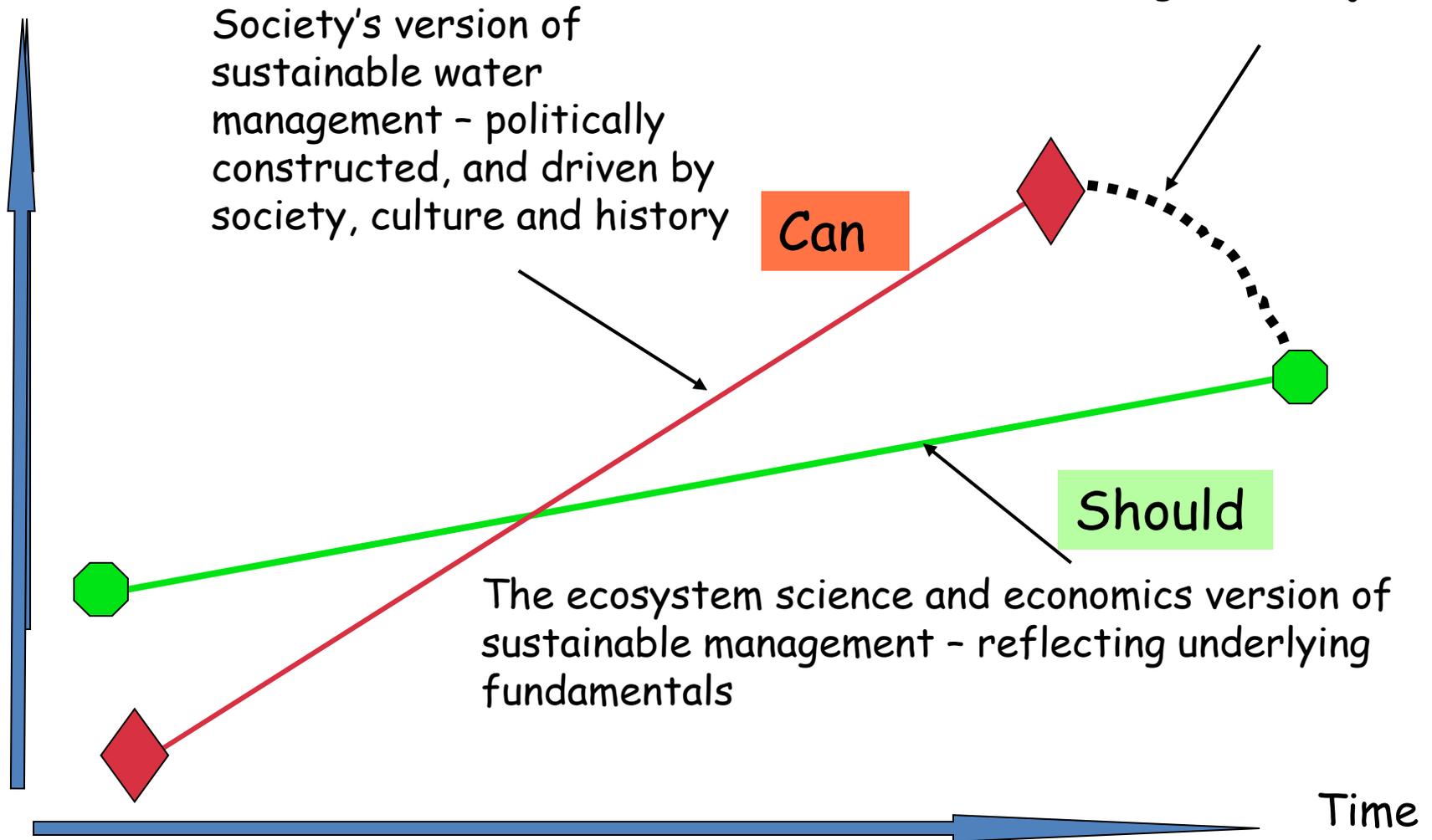
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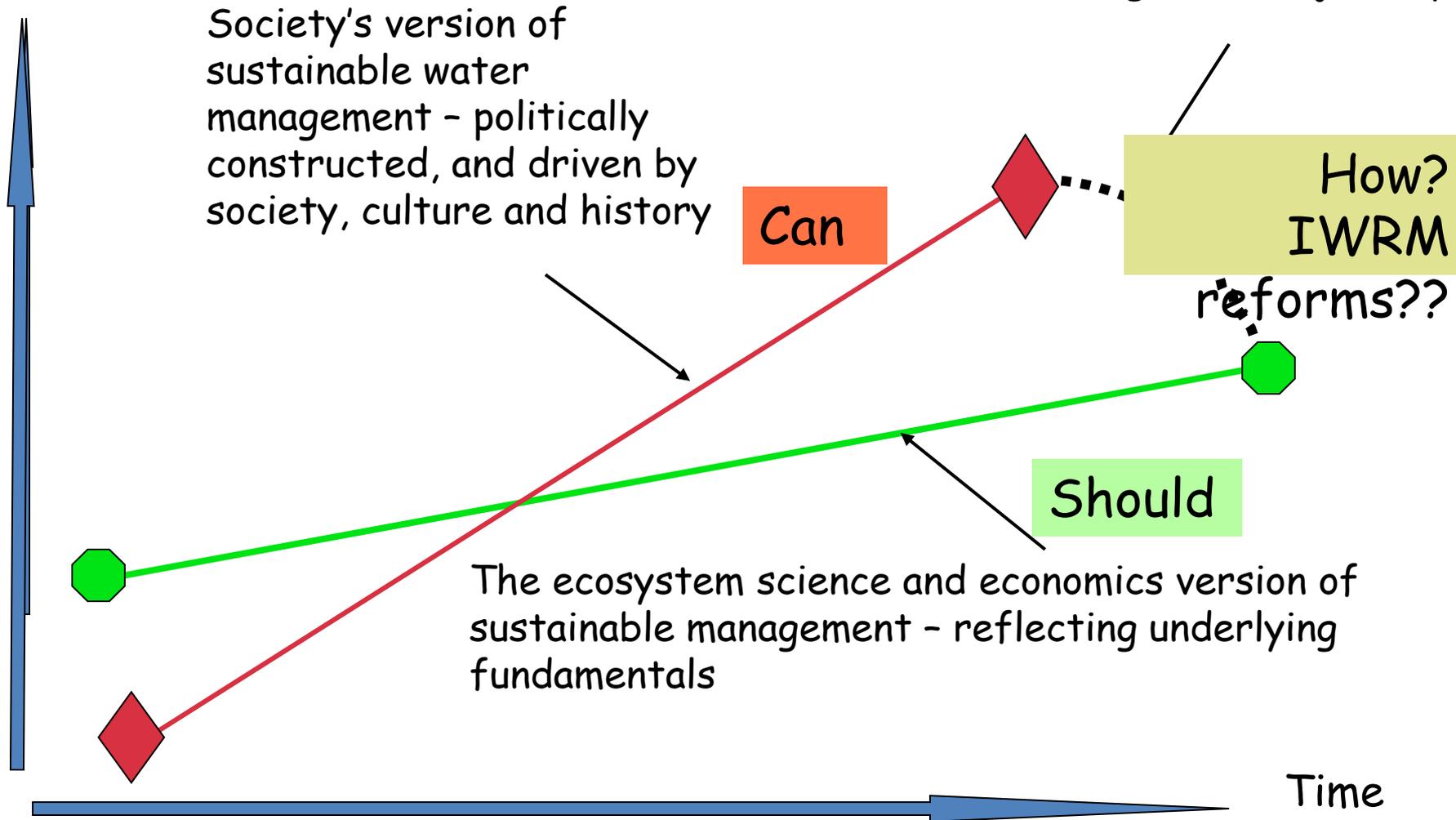
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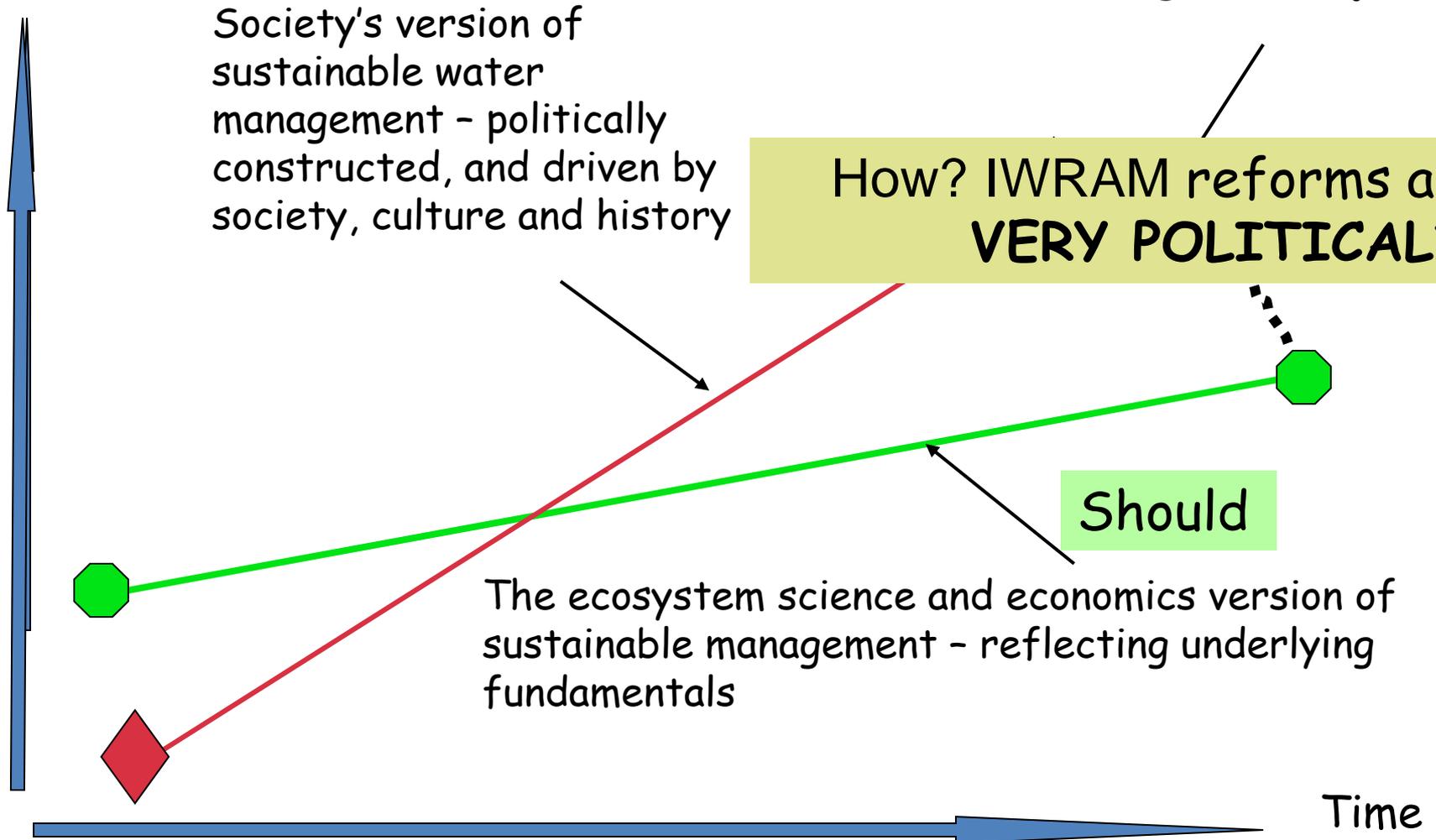
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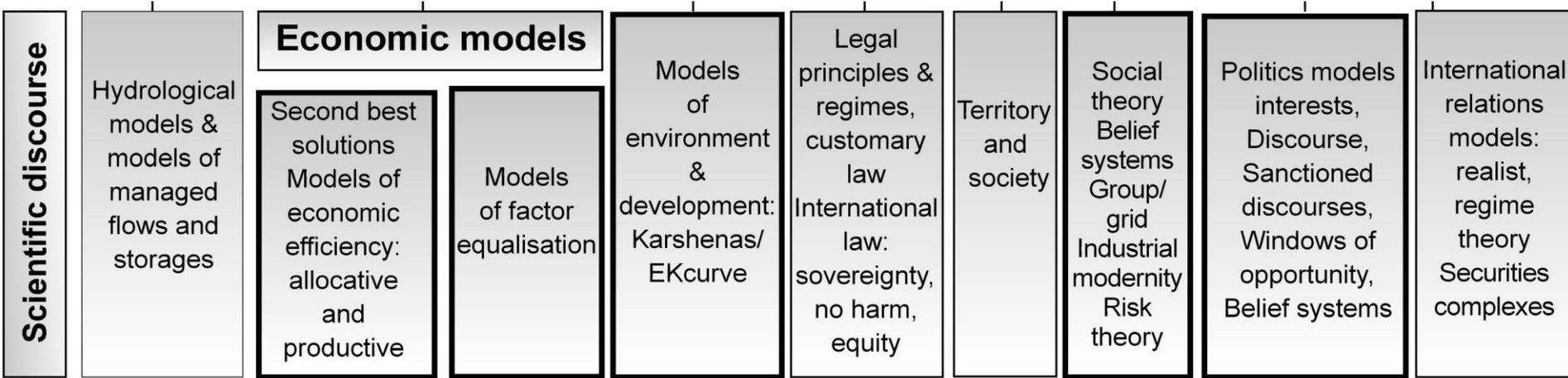


Water demand is determined by **consumers**
who have beliefs and expectations
that are based
on experience, cultural preferences, history
and NOT on science

Consumers and their assumptions are very important
indeed

The **extravagant consumers** in the North
The **optionless irrigators** in the South

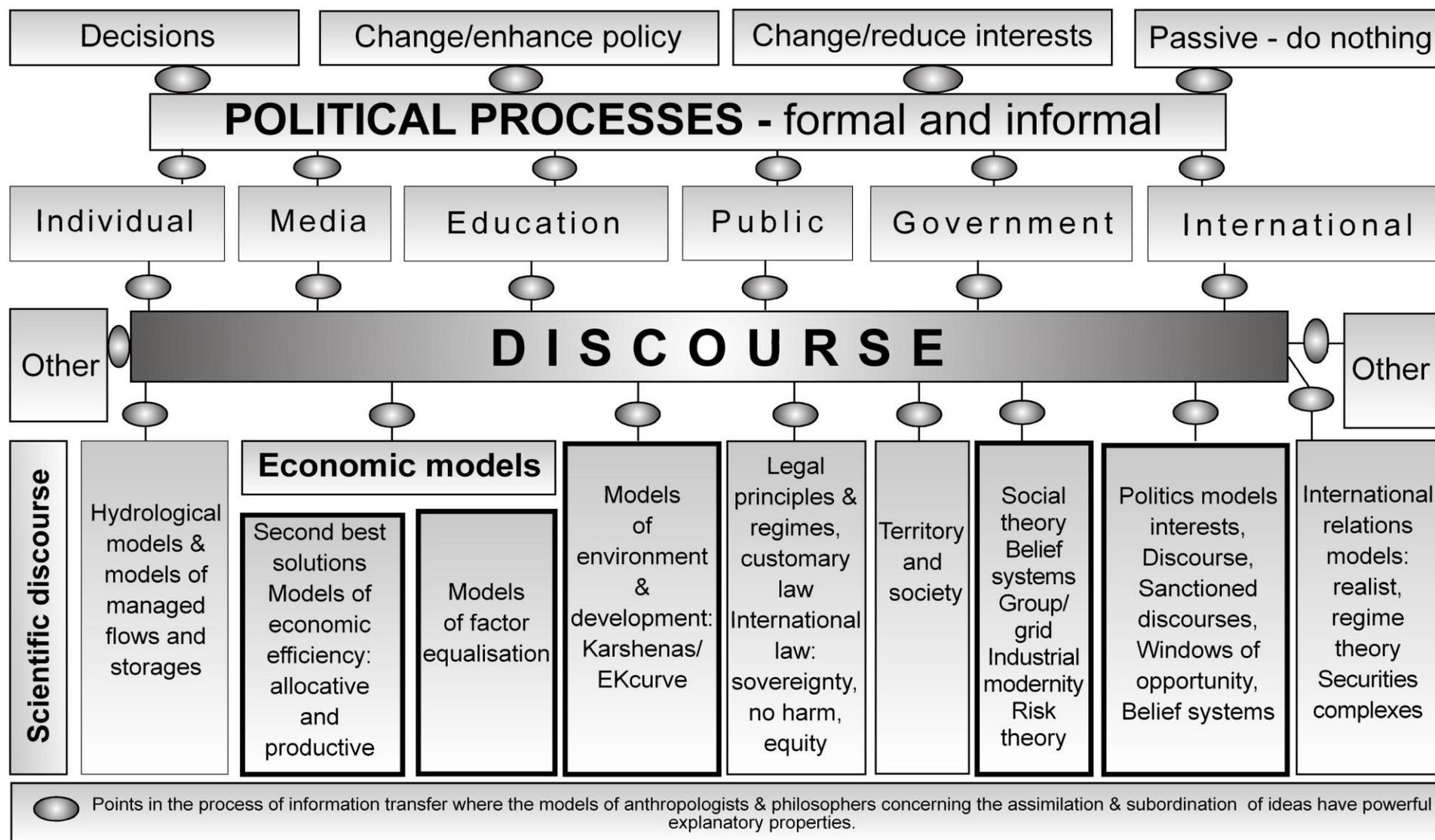
The science discourse



 Points in the process of information transfer where the models of anthropologists & philosophers concerning the assimilation & subordination of ideas have powerful explanatory properties.

Note: the framework can be applied at all scales - local, regional, national and international. The models of relevance to particular circumstances can be emphasised.

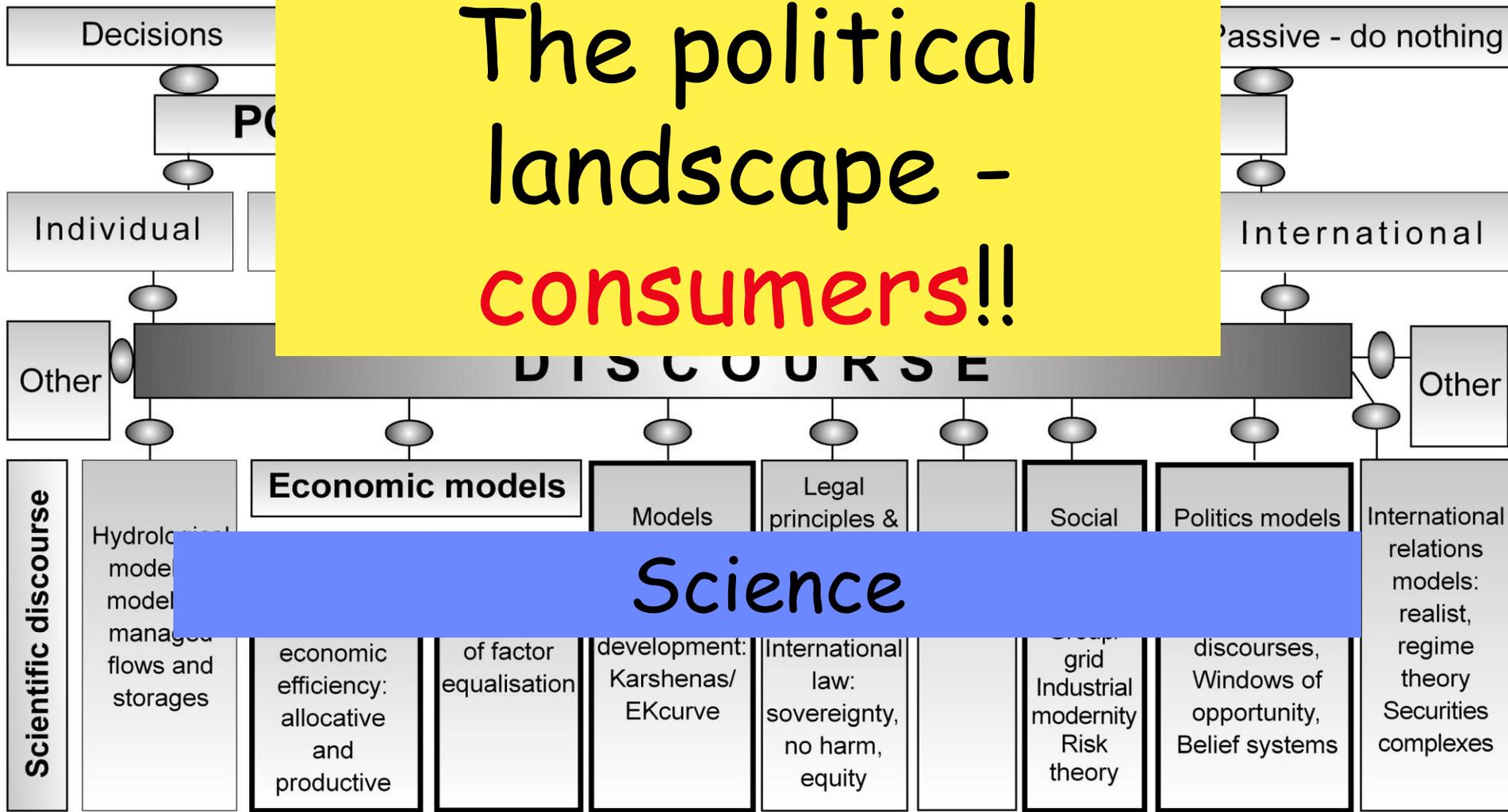
Figure 1.4 A conceptual framework: water resource science and political discourse



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Figure 1.4 A conceptual framework: water resource science and political discourse

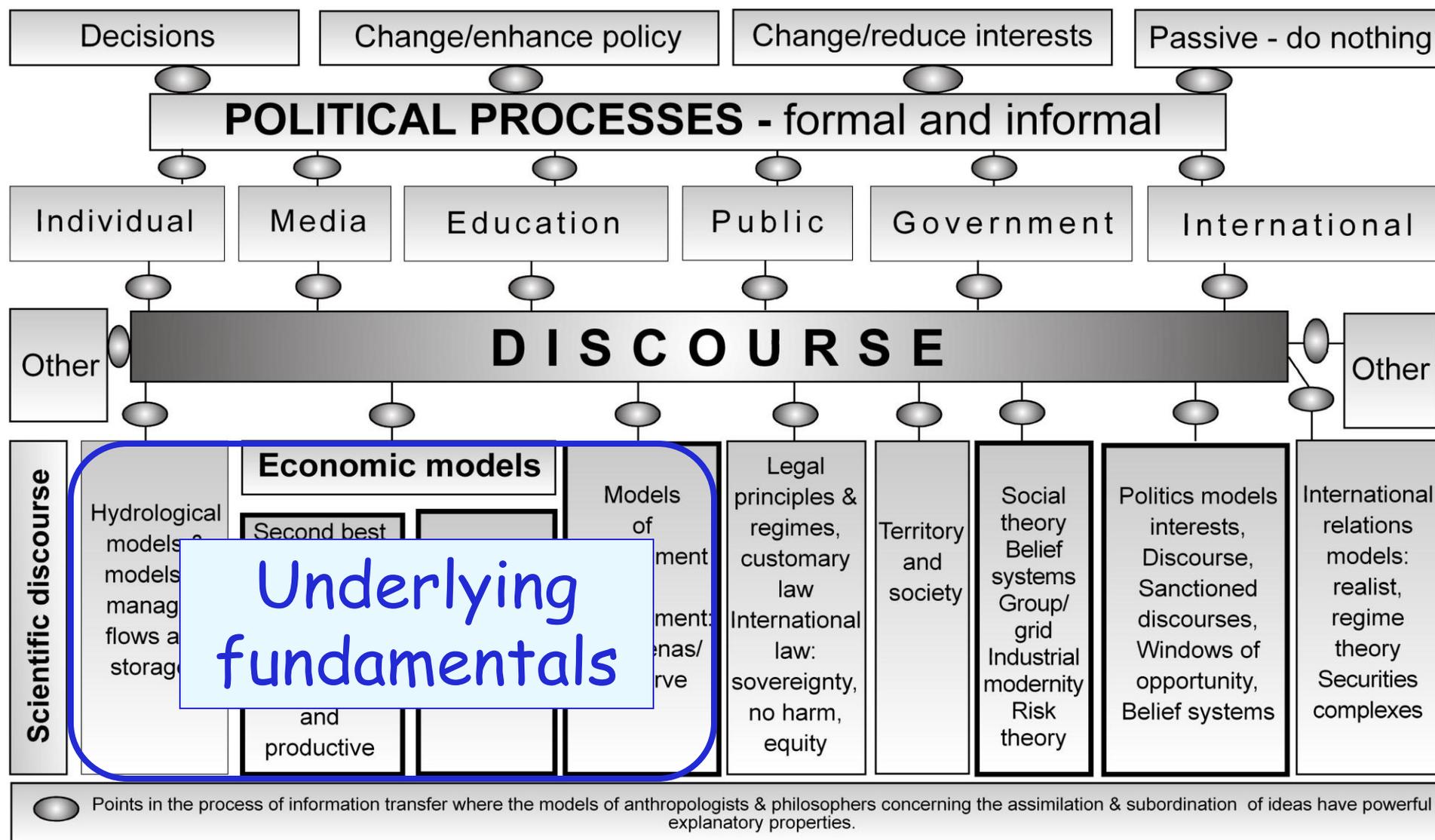
The political landscape - consumers!!



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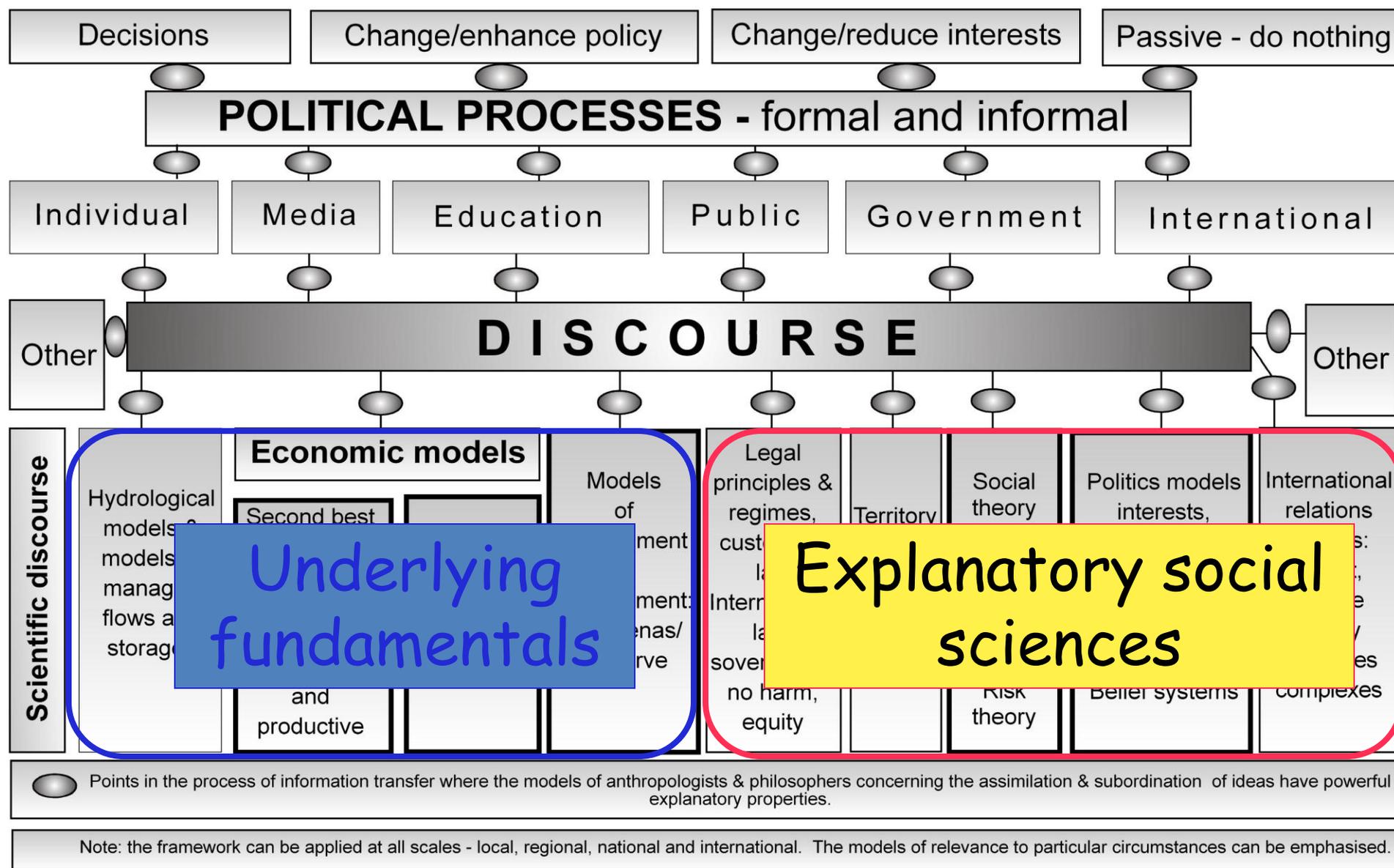
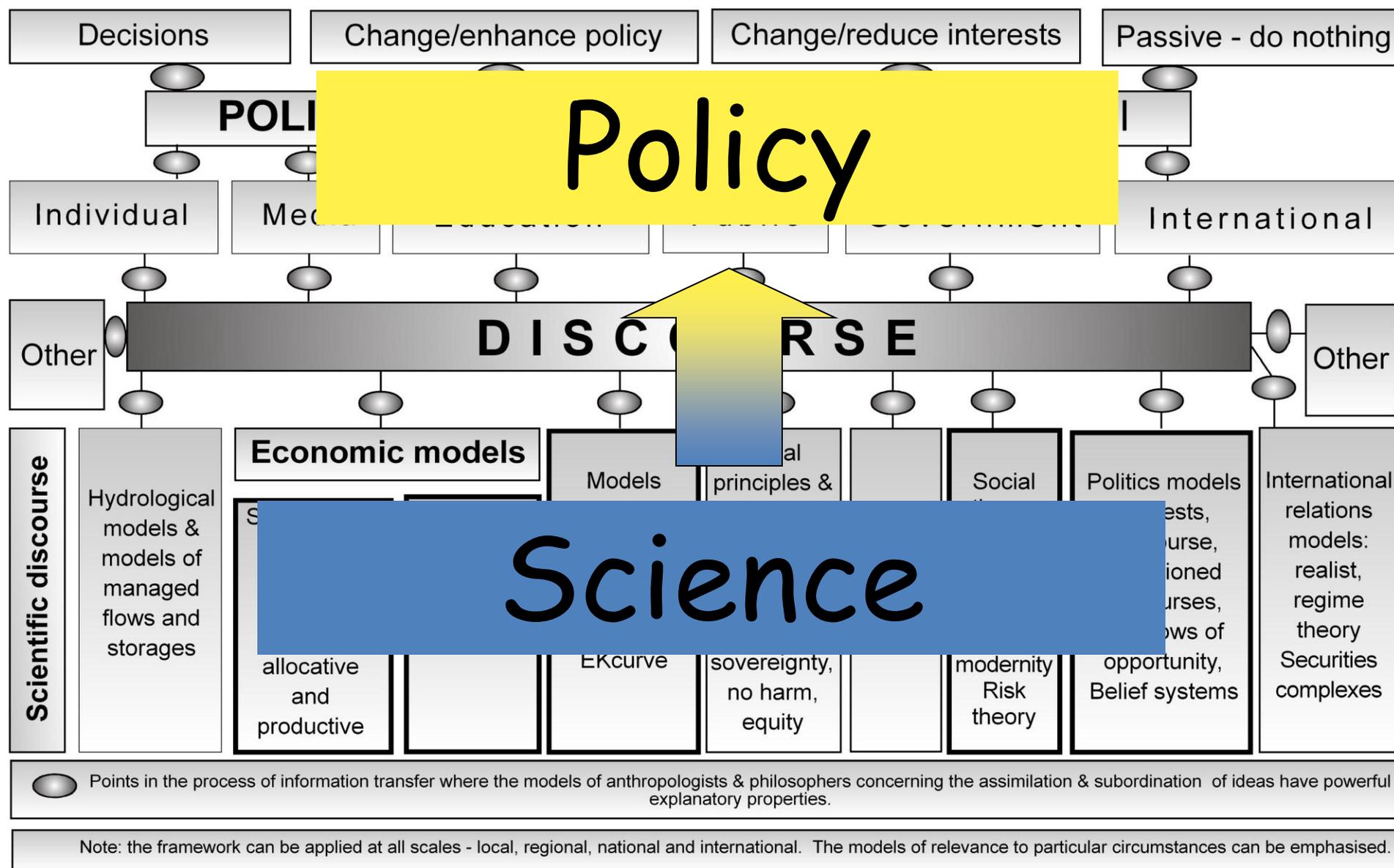


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Some other important water ideas

Virtual water

Water footprint

Embedded or virtual water

It takes 1000 tonnes (m³) of water to produce a tonne of wheat.

16000 tonnes to produce a tonne of beef.

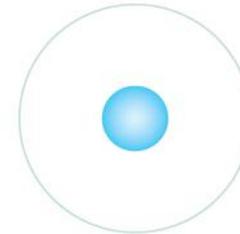
Importers of food 'export' their water footprint of the food imported - to the food exporter.

And the impacts on the environmental services of water.

Average Water Footprint per Capita (out of 132 countries)

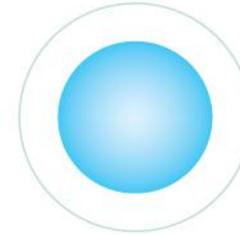
1,226 m³

5%  National Water for Domestic Needs



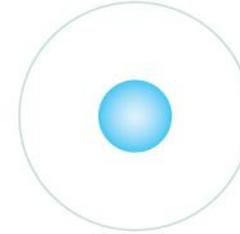
58.57 m³

73%  National Water for Agricultural Products



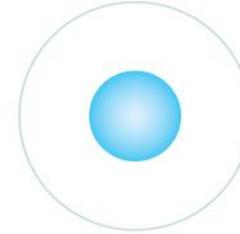
894.42 m³

6%  National Water for Industrial Products



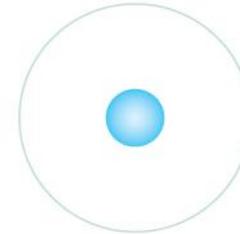
78.97 m³

13%  Foreign Water for Agricultural Products



154.31 m³

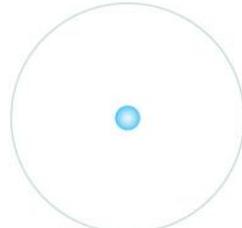
3%  Foreign Water for Industrial Products



39.67 m³



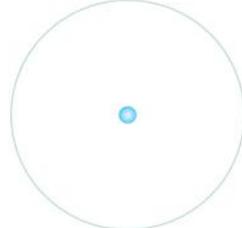
TANZANIA: 1,127 m³/cap



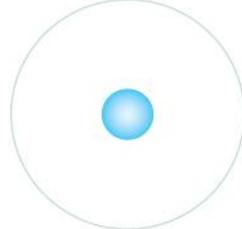
3 m³/cap



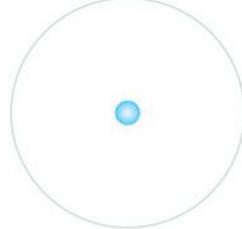
1,093 m³/cap



1 m³/cap



27 m³/cap

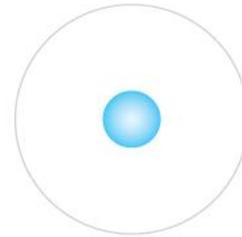


3 m³/cap

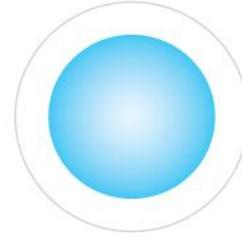




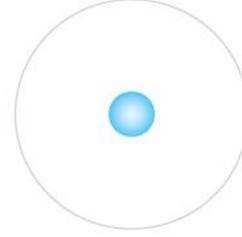
INDIA: 980 m³/cap



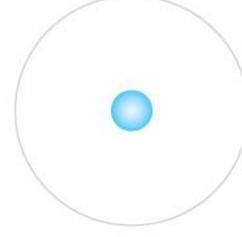
38 m³/cap



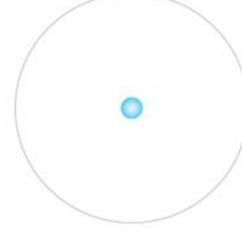
907 m³/cap



19 m³/cap



14 m³/cap

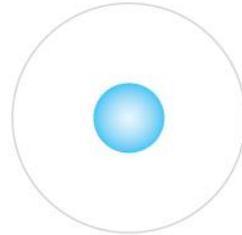


2 m³/cap





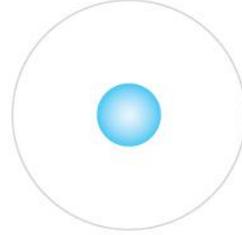
BRAZIL: 1,381 m³/cap



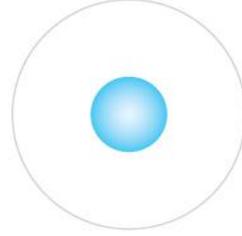
70 m³/cap



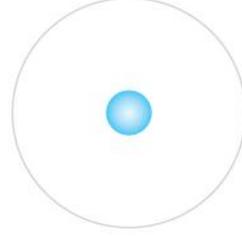
1,155 m³/cap



51 m³/cap

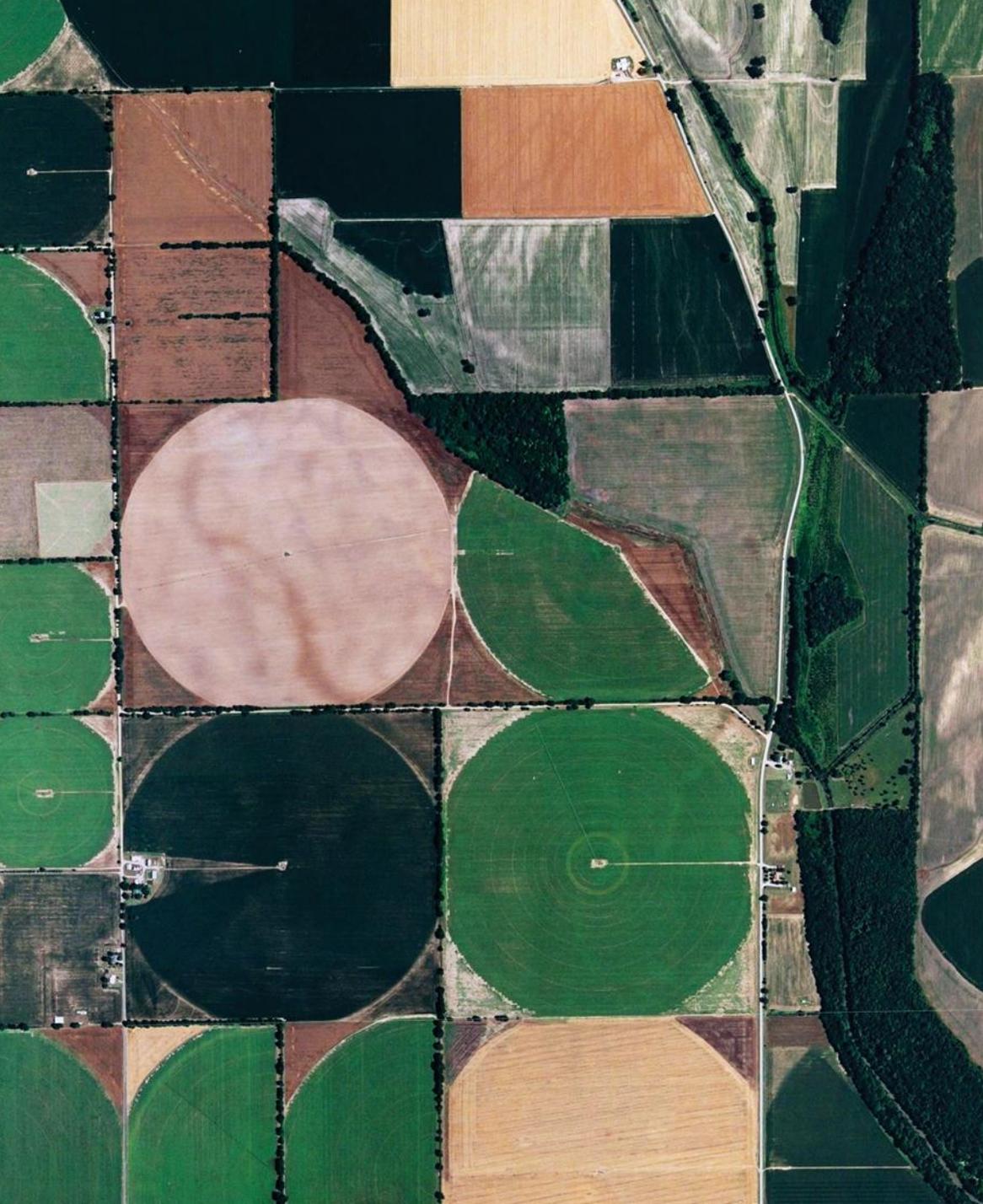


87 m³/cap

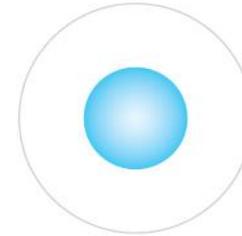


18 m³/cap

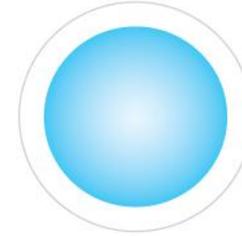




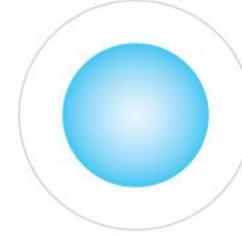
USA: 2,483 m³/cap



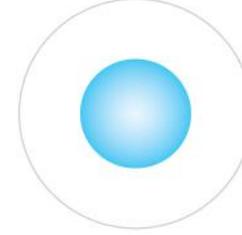
217 m³/cap



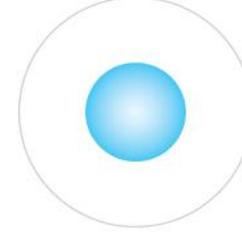
1,192 m³/cap



609 m³/cap



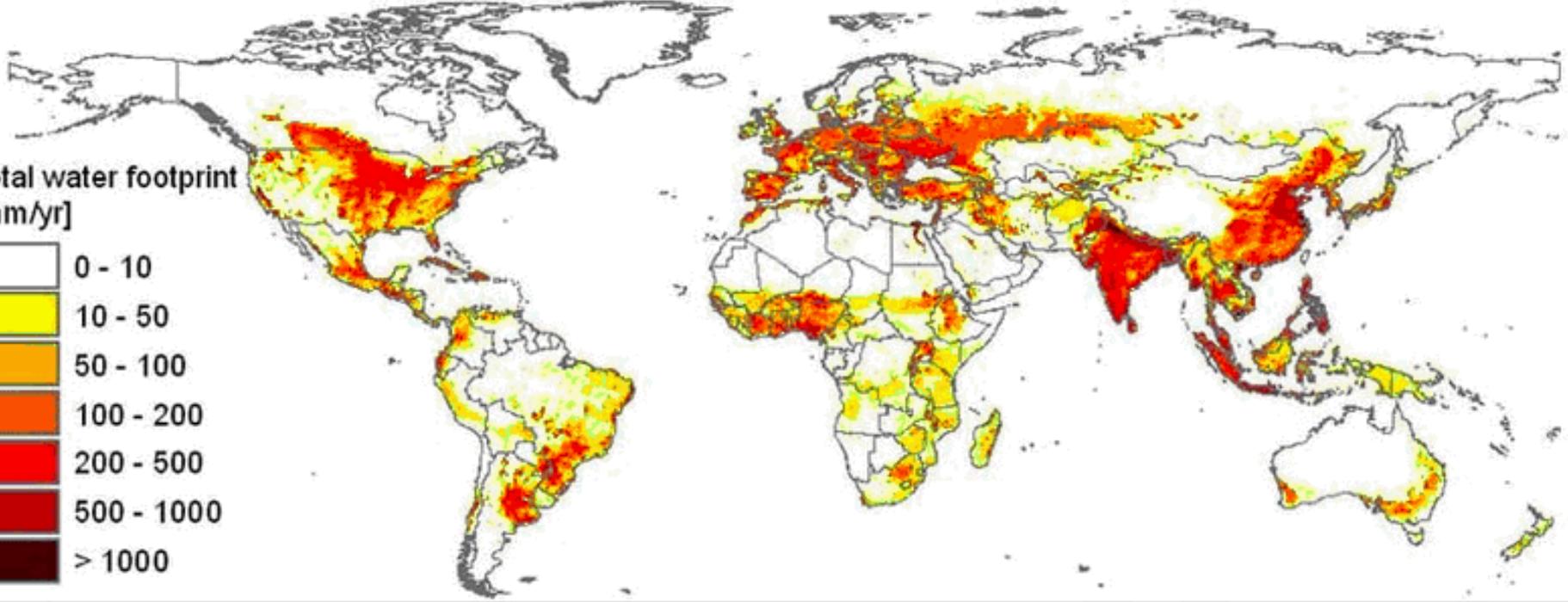
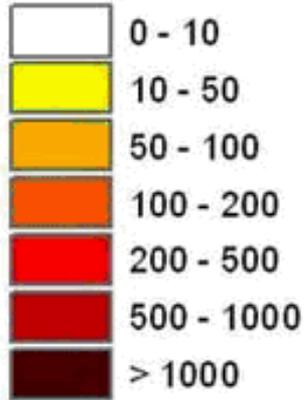
267 m³/cap



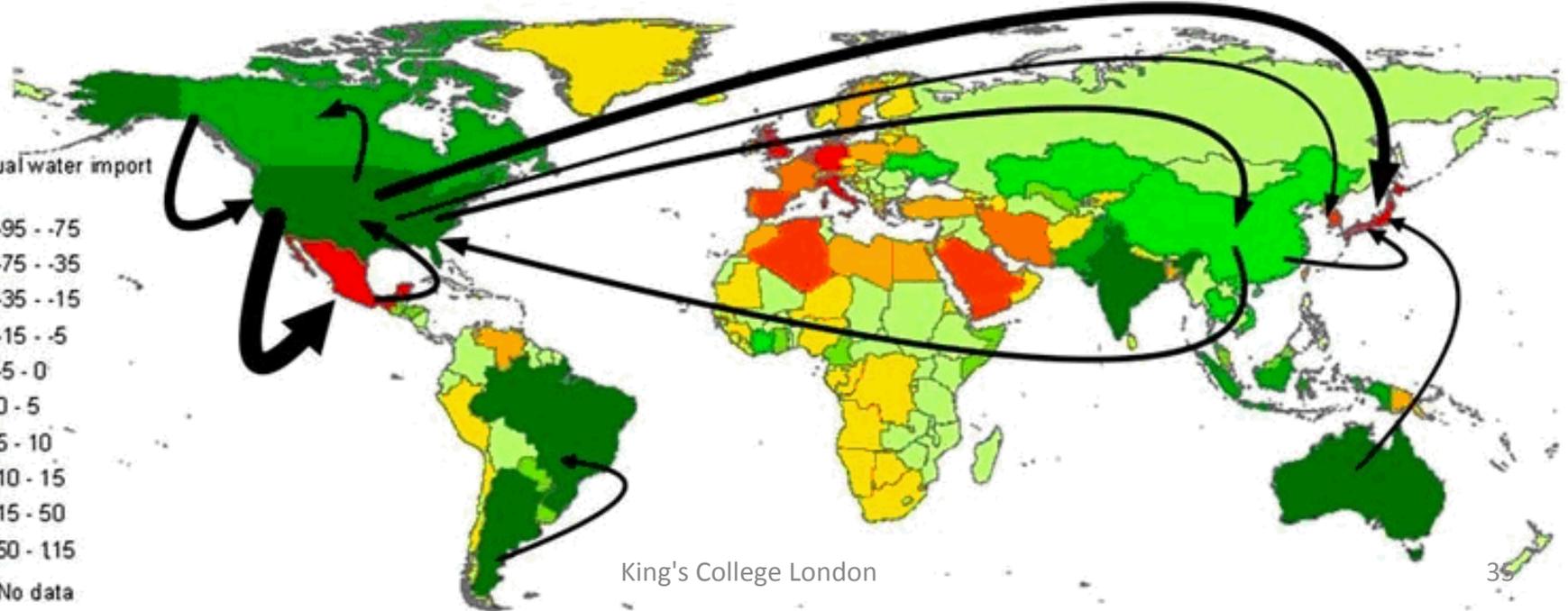
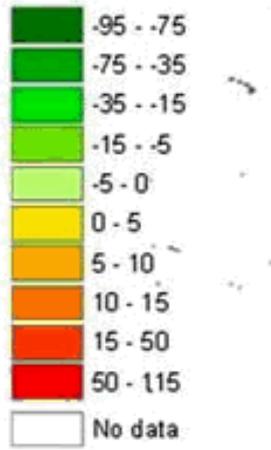
197 m³/cap



Total water footprint [mm/yr]



Net virtual water import [Gm³/y]



Water is managed by farmers and other agents in food supply chains.

These supply chains link farmers with

- **ag-industries** that supply seeds, fertilizers, pesticides and equipment
- **food traders, the food manufacturers**
- **food retailers & super-markets.**

90% of the water used by society is embedded in these food supply chains.

Water security - what does it mean?

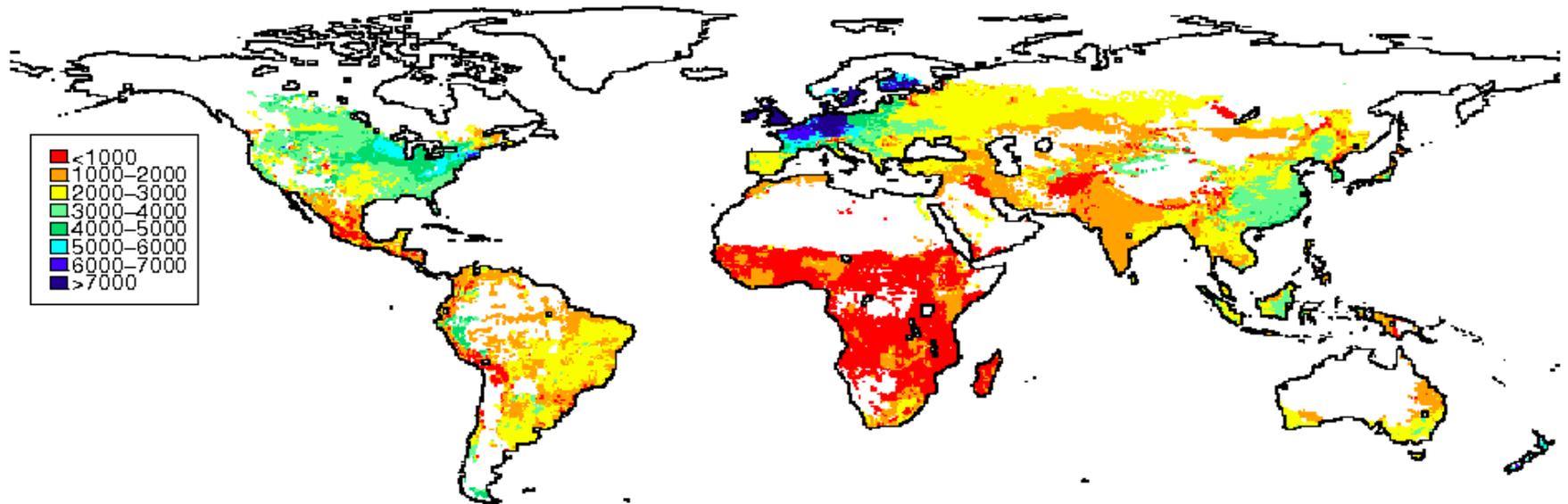
Is there enough water in the global system to meet the food demands of future populations?

Who matters? Agents in the food supply chain.

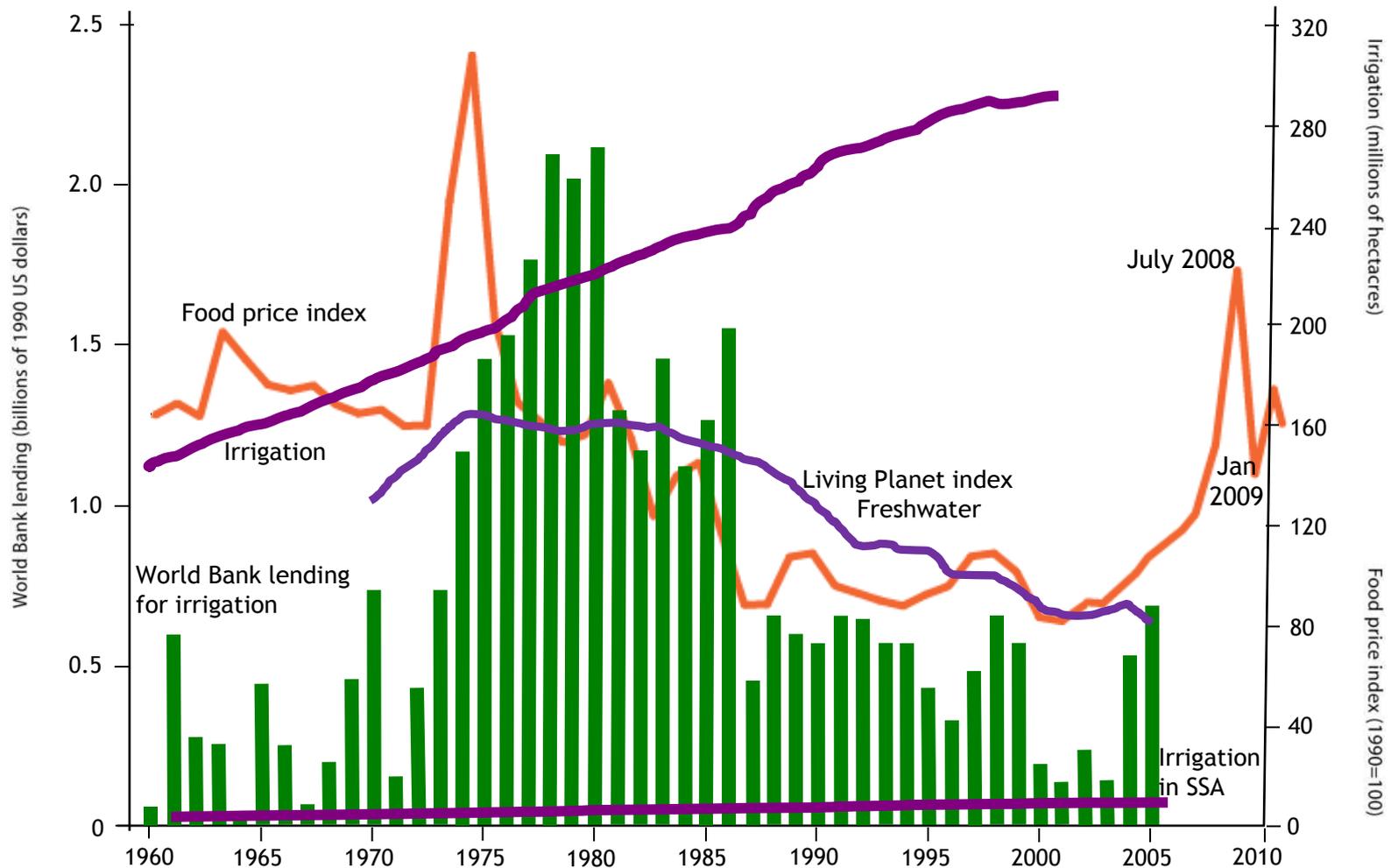
What matters? Rules and organisations in the food supply chain.

Agricultural water productivity

Farmers manage all the inputs that together determine water productivity

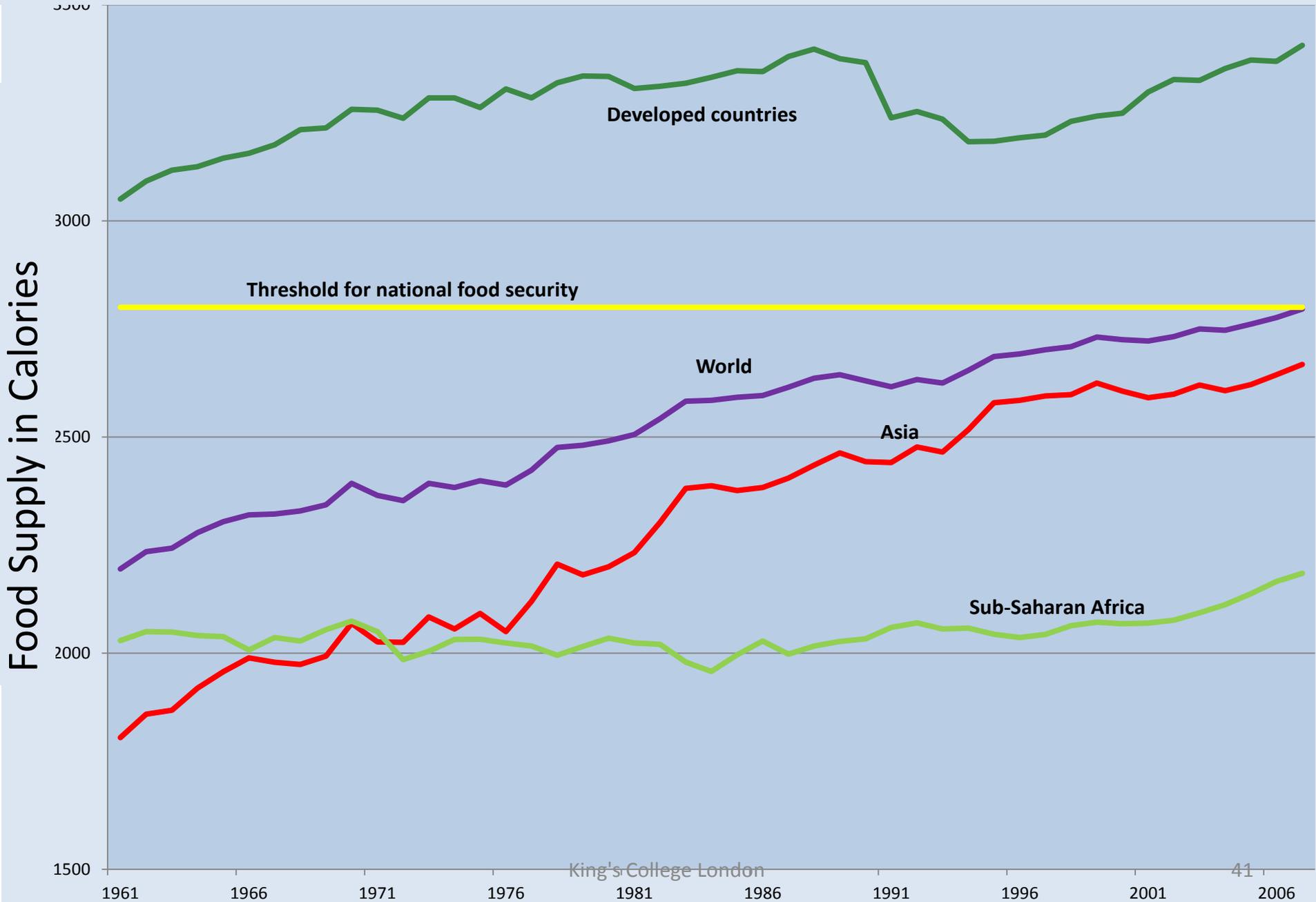


Investing in Irrigation



These trends are not understood

One liter of water produces one calorie on average



Will there be enough water?

More people – 6.5 to 9 billion people by 2050

More calories & more meat, fish, milk

More food production – need to increase grain production by 2050 – 40%? 70%? 100%?

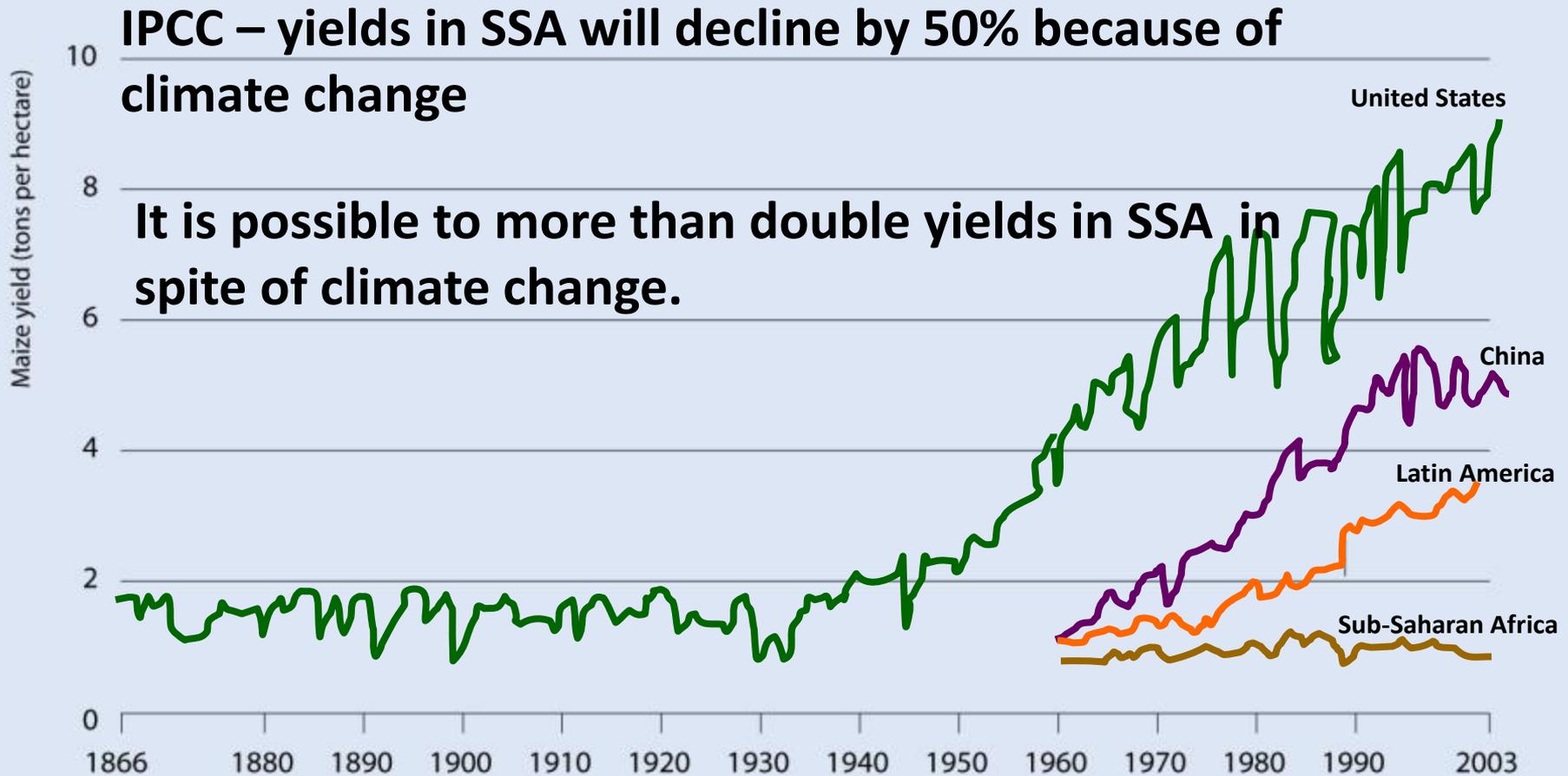
More water for food – via sustainable intensification

Pessimists are wrong but useful

Optimists are right but dangerous?



Growth in Yields



Source: U.S. data, U.S. Department of Agriculture's National Agricultural Statistics Service; all other countries and regions, FAOStat.

Food supply value chains

We need to understand them

Figure 1a The four social solidarities – or the four ways of life – in which society operates in interacting over interests, policies and outcomes. They differ in the extent to which they own, do, control and get what.

<p style="text-align: center;">Civil Society</p> <p style="text-align: center;">Consumers</p>	<p style="text-align: center;">The State (.GOV)</p> <p style="text-align: center;">The Public Sector – Government</p>
<p style="text-align: center;">The Market (.COM)</p> <p style="text-align: center;">The Private Sector</p>	<p style="text-align: center;">Civil Movements (.ORG)</p> <p style="text-align: center;">Sub-national, National & International NGOs and Unions</p>

All private sector & market owned,
controlled and benefit receiving
CIVIL SOCIETY

Subsistence farming families

Urban food consumers

Small-holder farmers - some market
participation

.COM

Market owned, run, controlled
& benefits received

Commercial farmers – small scale

Corporate farmers

International food commodity traders –
Non-Brand - ABCD

Agri-Business – Brands
– food commodity processing & trading

Supermarkets and food retailers

Public sector & civil movements
- exert some control
.GOV

Public sector interventions
Subsidies, incentives, regulation &
potential regulation

.ORG

Minor influence
but immense potential influence

Voices of environmental
& rights activists

All private sector & market owned,
controlled and benefit receiving
CIVIL SOCIETY

Public sector & civil movements
- exert some control
.GOV

Subsistence farming families

Public sector interventions
Subsidies, incentives, regulation &
potential regulation

90 %

.ORG
Minor influence
but immense potential influence

Voices of environmental
& rights activists

High Business Banks
– food commodity processing & trading

Supermarkets and food retailers

All private sector & market owned,
controlled and benefit receiving
CIVIL SOCIETY

Public sector & civil movements
- exert some control
.GOV

Subsistence farming families

90 %

Subsistence farming families &

10%

Small

Co-

Inter-

High Business Banks
– food commodity processing & trading

Supermarkets and food retailers

.ORG

Minor influence
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Voices of environmental
& rights activists

All private sector & market owned,
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CIVIL SOCIETY

Public sector & civil movements
- exert some control
.GOV

90 %

In Food Supply Chain
All Private Sector

-
Thinks it is a market.

-
But no water
accounting rules

-
Water value &
externalities blind

Public sector interventions
Subsidies, incentives, regulation &
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90 %

Food Supply Chain
Thinks it is a market.

-

But no water
accounting rules

-

All Private Sector

-

Water value &
Externalities blind

Public sector & civil movements
- exert some control
.GOV

10%

90 % in Public Sector
Tariffs common
Increasingly regulated &
re-used

Minor influence
but immense potential influence

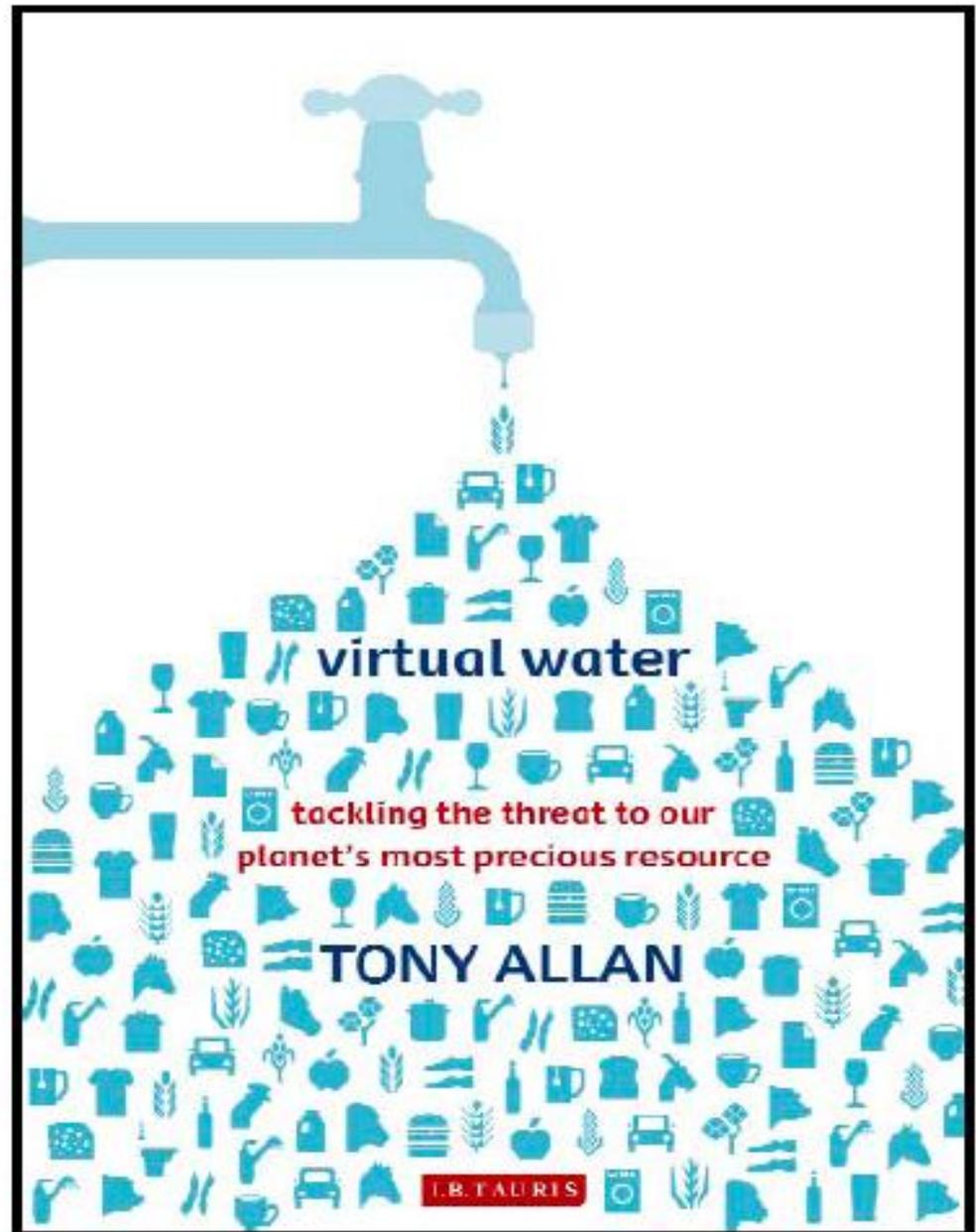
Voices of environmental
& rights activists

Who will save the world?

Farmers

Accountants

Optimists



Who will save the world?

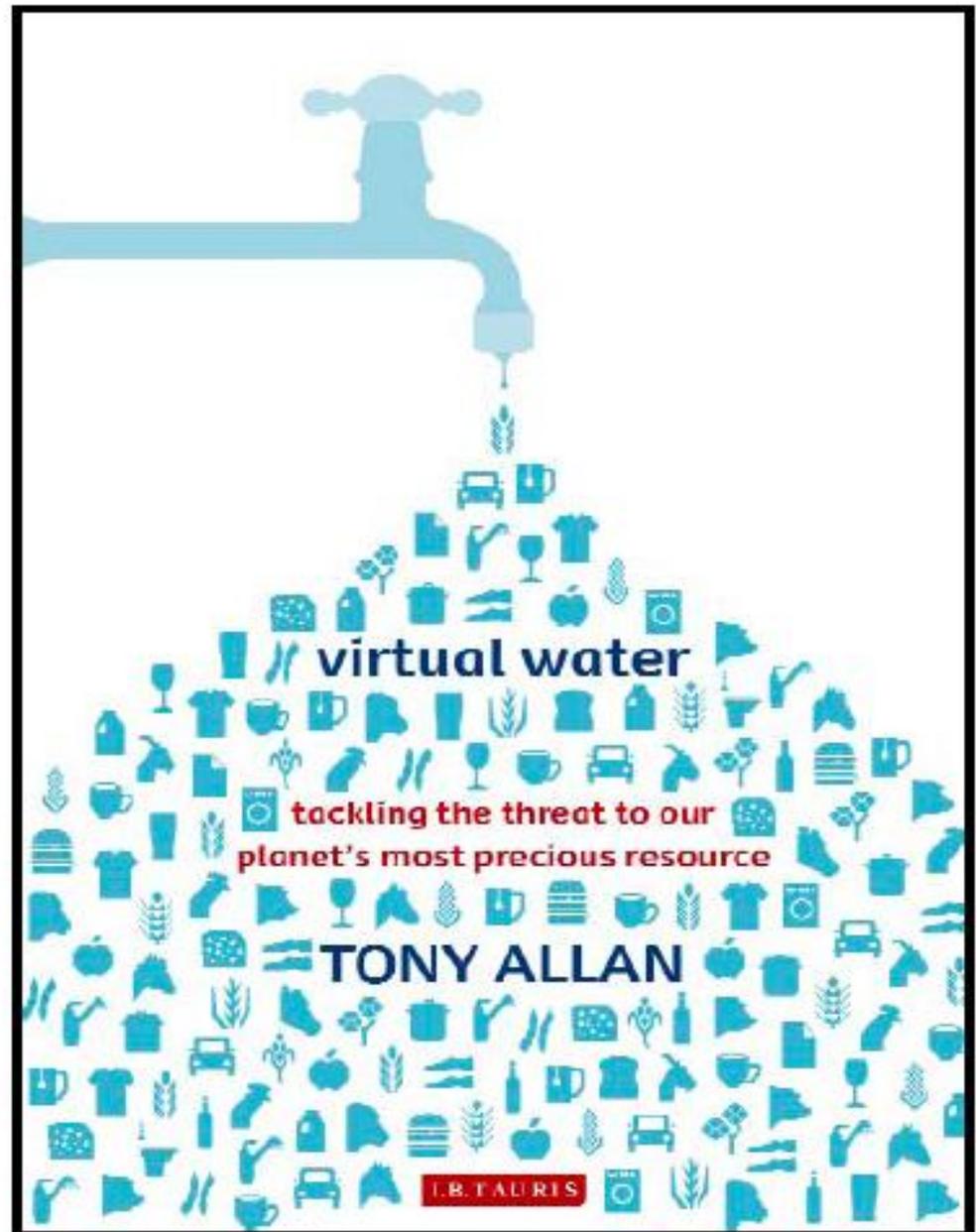
Farmers

Accountants

Optimists

Thank you

ta1@soas.ac.uk





Rose Duden

King's College London
It's what we suspected, he's become a vegetarian

Political, market, environmental contexts of **solutions**

Political

Remedy consequences of **cheap food policies** –
of .GOV & .COM alliance to satisfy voters and consumers

Social

Inform consumers on waste & food choice (obesity – **human health**)

Market

The **private sector agents** in the food supply chain have the potential to link consumers and farmers and are shaping to do it

The water and food sectors need to rethink **accounting standards**

Environmental

Remedy blue water scarcity hotspots – **environmental health**

Research

Invest in agricultural science investment – public and private



Global Water Security

http://www.dni.gov/files/documents/Special%20Report_ICA%20Global%20Water%20Security.pdf

INTELLIGENCE COMMUNITY ASSESSMENT

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This is an IC-coordinated paper.