

ENVIRONMENTAL SECURITY OF THE EUROPEAN CROSS-BORDER ENERGY SUPPLY INFRASTRUCTURE

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Environmental and Energy Security: Conceptual Evolution and Potential Applications to European Cross-boundary Energy Supply Infrastructure

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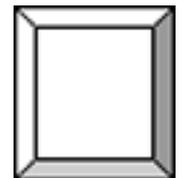
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1. Introduction: Definition of Security and Environmental Security

Arnold Wolfers (1962), pointed to 2 sides of security concept:

- “Security, in an **objective** sense, measures the absence of threats to acquired values, in a **subjective** sense, the absence of fear that such values will be attacked”.

From a **social constructivist** approach in international relations ‘security’ is the outcome of a process of social & political interaction where social values and norms, collective identities and cultural traditions are essential.

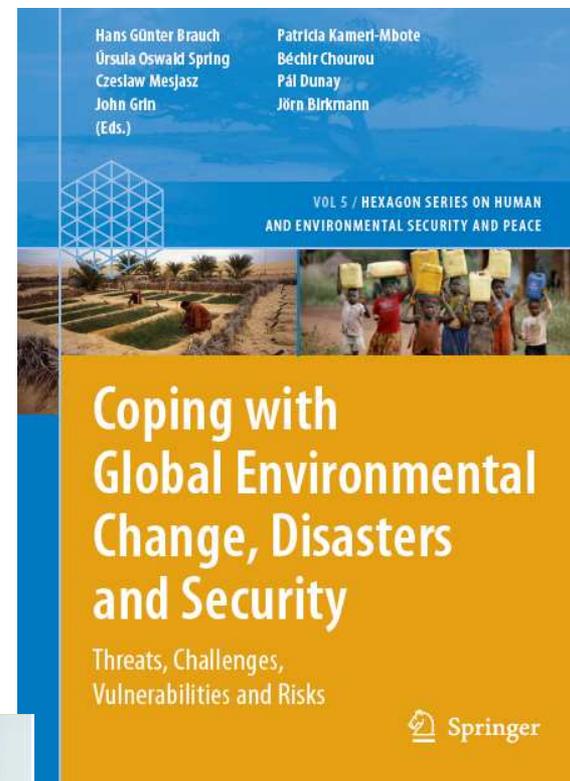
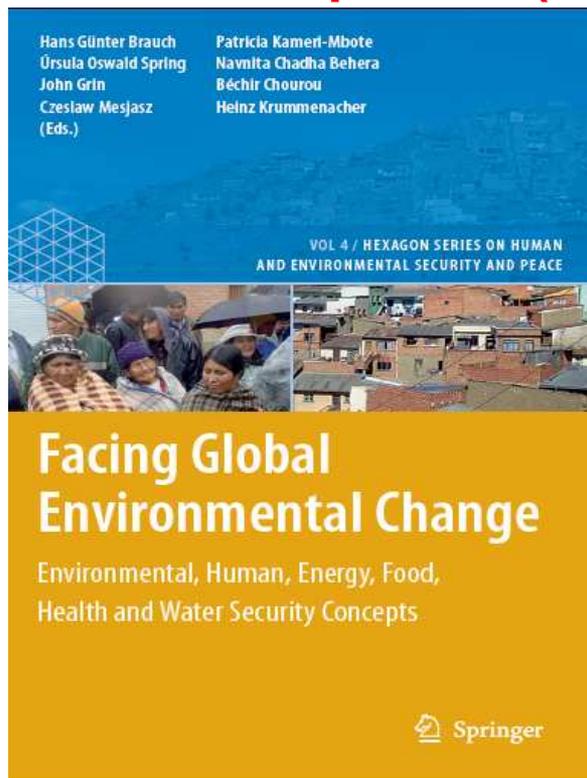
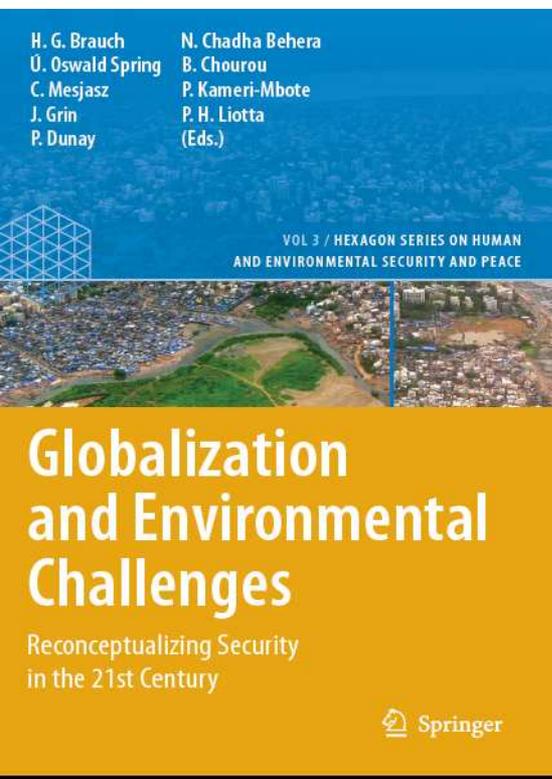
From the **perspective of social constructivism** security is **intersubjective** or “what actors make of it”. Most innovative theory is that of **Securitization** of the **Copenhagen School**:

- **Global Research and dialogue project (2004-2011) on Re-conceptualization of Security**: written by 300 scholars, 100 countries: **270 peer reviewed chapters!**

1.1. Hexagon Series: Volumes III-V

<http://www.afes-press-books.de/html/hexagon.htm>

Global Environmental and Human Security Handbook for the Anthropocene (GEHSHA)



1.2. From International & National to Environmental and Human Security

- **International Peace & Security**: League of Nations (1919): “high contracting parties”; UN Charter (1945): “*We the peoples of the United Nations*”
- **National Security**: new U.S. concept World War II, post WW II: National Security Act (1947), before: goal defence, means: Army (War Dep.), & Navy Dept.
- **Alliance Security**: NATO (1949-), WP (1955-1991)
- **Common Security** (Palme Report 1982)
- **Environmental Security** (Brundtland 1987, Gorbachev 1988)
 - **1989/1990**: Widening, Deepening, Sectorialization
- **Cooperative Security**: Brookings Institution (1990’s)
- **Human Security**: UNDP (1994): 4 pillars of Human Security

1.3. Early Proposals: Brundtland (1987) & Gorbachev (1988)

- **Gro Harlem Brundtland (1987: 189-194) pointed to the new 'threats' to security:**
 - These may be caused by social unrest caused by poverty and inequality, by environmental degradation, by internal conflicts leading to new flows of refugees. ...
 - **The pressure on the environment from a rapidly growing world population will increase the likelihood of such conflicts. Climate change, desertification, deforestation, massive loss of species and biological diversity, depletion of freshwater resources and soil erosion are global trends that are not sustainable. ...**
 - The most global, and potentially the most serious, of all the issues facing us today is how we should deal with the threats to the world's atmosphere.
- **President Mikhail Gorbachev, at UN GA on 7 Dec. 1988:**
 - discussed **ecological dimension of international security ...**
 - "The relationship between man and the **environment has become menacing. ... The threat from the sky is no longer missiles but global warming**".
 - He called for defining "**the world ecological threat.**" Eduard Shevardnadze proposed the creation of an "**international regime of ecological security**" and a programme of its implementation.
 - In his article "Reality and Guarantees for a Secure World," (September 1987) Mikhail Gorbachev stressed the **universal character of ecological security.**

1.4. Proposals by Gorbachev at the UNGA 7 December 1988

- International economic security is inconceivable unless related not only to disarmament but also to the **elimination of the threat to the world's environment.**
- In a number of regions, the state of the environment is simply frightening. **Let us also think about setting up within the framework of the United Nations a center for emergency environmental assistance.** Its function would be promptly to send international groups of experts to areas with badly deteriorating environment.
- **The Soviet Union is also ready to cooperate in establishing an international space laboratory or manned orbital station designed exclusively for monitoring the state of the environment.** In the general area of space exploration, the outlines of a future space industry are becoming increasingly clear.
- The position of the Soviet Union is well known: activities in outer space must rule out the appearance of weapons there. Here again, there has to be a legal base. The groundwork for it - the provisions of the 1967 treaty and other agreements - is already in place.
- We have put forward our proposal to establish it on more than one occasion. We are prepared to incorporate within its system our Krasnoyarsk radar station. A decision has already been taken to place that radar under the **authority of the U.S.S.R. Academy of Sciences.**
- **Soviet scientists are prepared to receive their foreign colleagues and discuss with them ways of converting it into an international center for peaceful cooperation by dismantling and refitting certain units and structures, and to provide additional equipment.**
- **The entire system could function under the auspices of the United Nations.**

2. Three Reasons for the Reconceptualization of Security

Contextual Change

- **End of the Cold War** (1989-1991), 11 September 2001 or the Global Financial Crisis since 2008?
- ***Globalization***: role of non-state actors
- **Global Environmental Change**

Conceptual Innovation:

- **Ulrich Beck**: (international) Risk society (1986, 2007)
- **Ole Waever**: Theory of securitization
- **Paul J. Crutzen (nobel laureate)**: Transition of earth history from the **Holocene** to the **Anthropocene**.

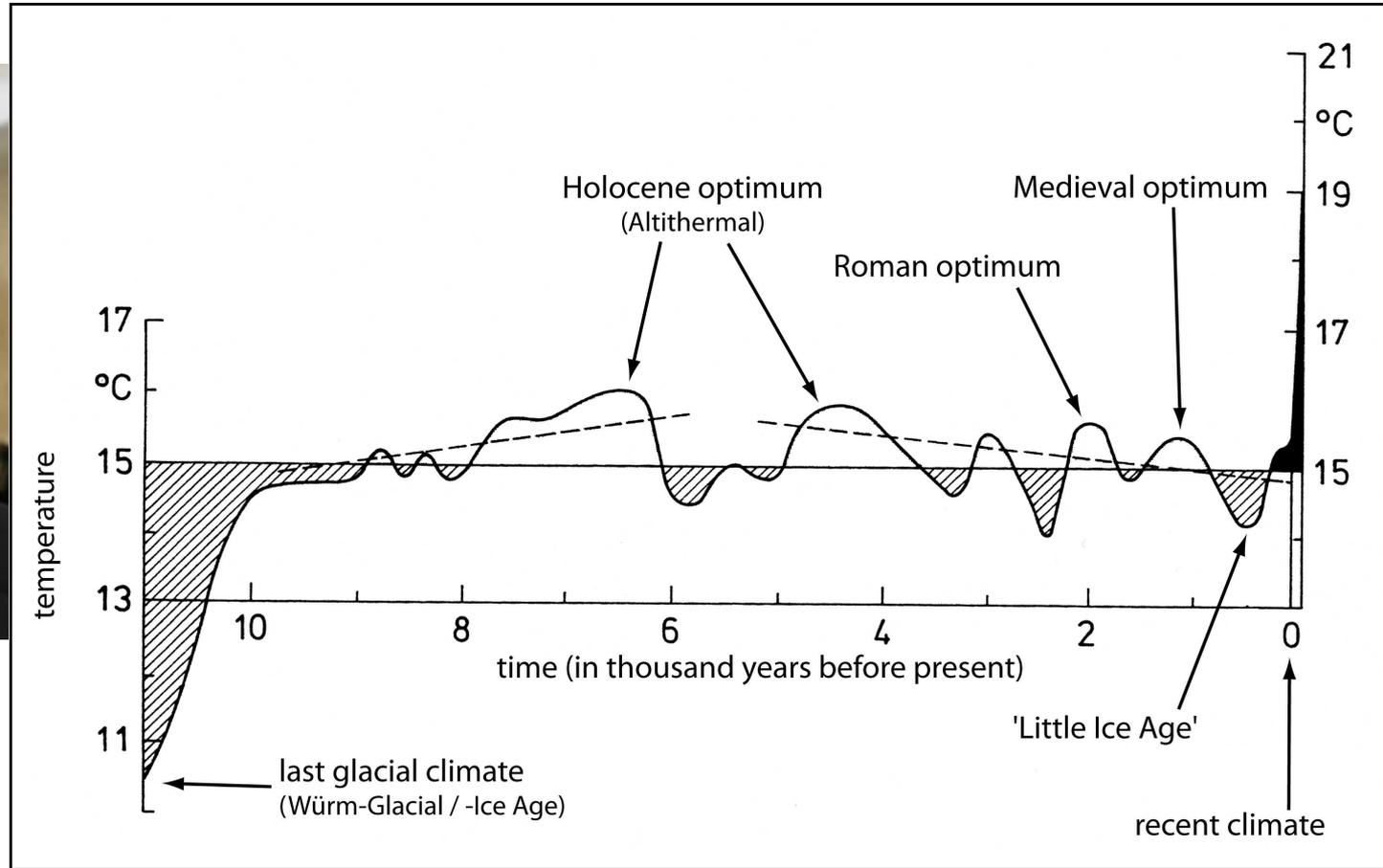
2.1. Copenhagen School: Securitization

- **Securitization:** discursive & political process through which an intersubjective understanding is constructed within a political community to treat something as an existential threat to a valued referent object, and to enable a call for urgent and exceptional measures to deal with the threat.
- **‘Referent object’** (that is threatened and holds a general claim on ‘having to survive’, e.g. **state, environment or liberal values**),
- **‘Securitizing actor’** (who makes the claim – speech act – of pointing to an existential threat to referent object thereby legitimizing extraordinary measures, often but not necessarily to be carried out by the actor), and
- **‘Audience’** (have to be convinced in order for the speech act to be successful in the sense of opening the door to extraordinary measures).
- **It is not up to analysts to settle the ‘what is security?’** question – widening or narrowing – but more usefully one can study this as an open, empirical, political and historical question.
- **Who manages to securitize what under what conditions & how?**
- **What are the effects of this?** How does the politics of a given issue change when it shifts from being a normal political issue to becoming ascribed the urgency, priority and drama of **‘a matter of security’**.

2.2. From the **Holocene** (12.000 years b.p.) to the **Anthropocene** (1784 AD)



**Paul Crutzen,
Nobel Laureate for
Chemistry (1995)**



In Geology/geography: **Holocene** era of earth history since end of glacial period (10-12.000 years ago, **Anthropocene**, since industrial revolution (1784, Watt's invention of steam engine: **anthropogenic climate change**: burning of coal.oil,gas→GHG increase

2.3. What has changed?

Crutzen & Braudel's historical times

- a. **Geological times:** Holocene to Anthropocene (Crutzen)
- b. **Macrostructural (very long-term):** Impact of 1st & 2nd industrial revolution (on **environment & warfare**)
 - Agricultural revolution
 - **Industrial Revolution (1780-1914):** burning of hydrocarbons
 - Communication, Transportation & IT Rev. (1890/1914-present)
 - Fourth Sustainability Revolution (paradigmatic scientific change)

Braudel's three historical times:

- c. **Structural (long-term):** Political revolutions, **change of international order** (context of security) as occurred in 1989/1990
- d. **Conjuncture (medium term):** Business cycles, presidencies
- e. **Events (short-term)**
 - **Single events (without major contextual changes):**
 - Many (e.g. State of the Union Speech of Pres. Obama)
 - **Structure or context changing events.**
 - E.g. 11 September 2001: for the USA and globally?

3. Three Processes of the Reconceptualization of Security

- **Widening** (one of 5 dimensions: environmental security),
- **Deepening** (state to people-centred: levels, actors)
- **Sectorialization** (one of several concepts: energy security),

Dimensions & Levels of a Wide Security Concept

Security dimension ⇒ ↓ Level of interaction	Military	Political	Economic	Environmental ↓	Societal
Human being, Community, humankind ⇒			Food sec. Health sec.	Cause & Victim	Food sec. Health sec.
Societal/Community				↓↑	
National	shrinking		Energy security	↓↑	Food & health security
International Regional			Water security	↓↑	Water security
Global/Planetary ⇒				GEC	

3.1. National, Environmental & Energy Security

Label	Reference object	Value at risk	Source(s) of threat
National security	The State	Territ. integrity	State, substate actors
Societal security	Societal groups	National identity	Nations, migrants
Human security	Individual, mankind	Survival	Nature, state, global.
Environmental security	Ecosystem	Sustainability	Humankind
Energy security	Supply of fossil energy sources (demand side vs. supply side)	Interruption of supply	Boycott (1973) Deliberate attack on infra-structure Accidents (tanker, pipeline etc.)

3.2. Widening: New Security Dimension Environment and Security Linkages

- ***Encyclopaedia Britannica*** (1998) defined ‘environment’:
“the complex of physical, chemical, and biotic factors that act upon an organism or an ecological community and ultimately determine its form and survival”.
 - **Neo-Malthusian**: Resource scarcity (L. Brown, N. Myers)
 - **Cornucopian**: Abundance (B. Lomborg)
 - **Pragmatic multilateralist**: cooperation in international organizations matters
- **Subjective security perception depends on worldviews, mindsets or traditions:**
 - ❖ **Hobbessian** pessimist: **power is the key category** (narrow concept)
 - ❖ **Kantian** optimist: **international law and human rights are crucial**
 - ❖ **Grotian** pragmatist: **co-operation is vital** (wide security concept)

3.3. Ideal Type Worldviews on Security and Standpoints on Environment

Worldview/Tradition on security (→) Standpoints on environmental issues (↓)	Machiavelli, Hobbes, Morgenthau, Waltz (pessimist, realist school)	Grotius, pragmatist <i>Cooperation is needed, matters</i>	Kant, neoliberal institutionalist (optimist) <i>International law matters and prevails (Democratic peace)</i>
Neomalthusian <i>Resource scarcity</i> (pessimist)	I	II ←	III ↙
Reformer, <i>Multilateral cooperation solves challenges</i> (pragmatist)	IV	V	VI
Cornucopian <i>Technological ingenuity solves issues</i> (neoliberal optimist)	VII	VIII	IX

4. Definition & Evolution of Energy Security

- *Energy security: response to Arab oil shocks of 1973: establishment of International Energy Agency*
- *Energy security* has different meanings for the **supplier** (e.g. oil producing and exporting countries and oil companies are interested in good prices and in a steady demand, i.e. in energy demand security) while the **consumers** are interested in an uninterrupted supply at affordable prices (**energy supply security**).
- Energy security applies to all five dimensions and to all referent objects. Energy supply security is a precondition of military, political and economic security and it has impacts on the environmental and societal security dimensions.

4.1. Tasks of International Energy Agency

Main aims of energy cooperation among IEA countries are:

- To maintain and improve systems for **coping with oil supply disruptions**;
- To promote rational energy policies in a global context through co-operative relations with non-member countries, industry and international organizations;
- To operate a permanent information system on the international oil market;
- To improve the world's energy supply and demand structure by developing alternative energy sources and increasing the efficiency of energy use; and
- To assist in the integration of environmental and energy policies.
- Oil crisis management and the information system on the international oil market are the IEA's only short-term policy issues and instruments. Promotion of national energy policies, improvement of the world's energy supply and demand structure and the fostering of environmentally-related energy policies are more related to medium- and long-term tasks.

Objectives of IEA focused on energy security,

- from **responses to short-run oil emergencies** and
- to long-term ameliorative solutions to the broader problems of **reducing oil import dependence, promoting energy policy which supports energy efficiency and diversifying fuels.**
- The IEA's initial stockholding obligation as formulated in 1974 was "to maintain emergency reserves sufficient to sustain consumption for at least 60 days with no net oil imports"

5. Evolution of Environmental Security

Four Stages of Research (1983 - 2006)

Debates: Environmental security & climate change & security

a) Environmental impact of war (Arthur Westing)

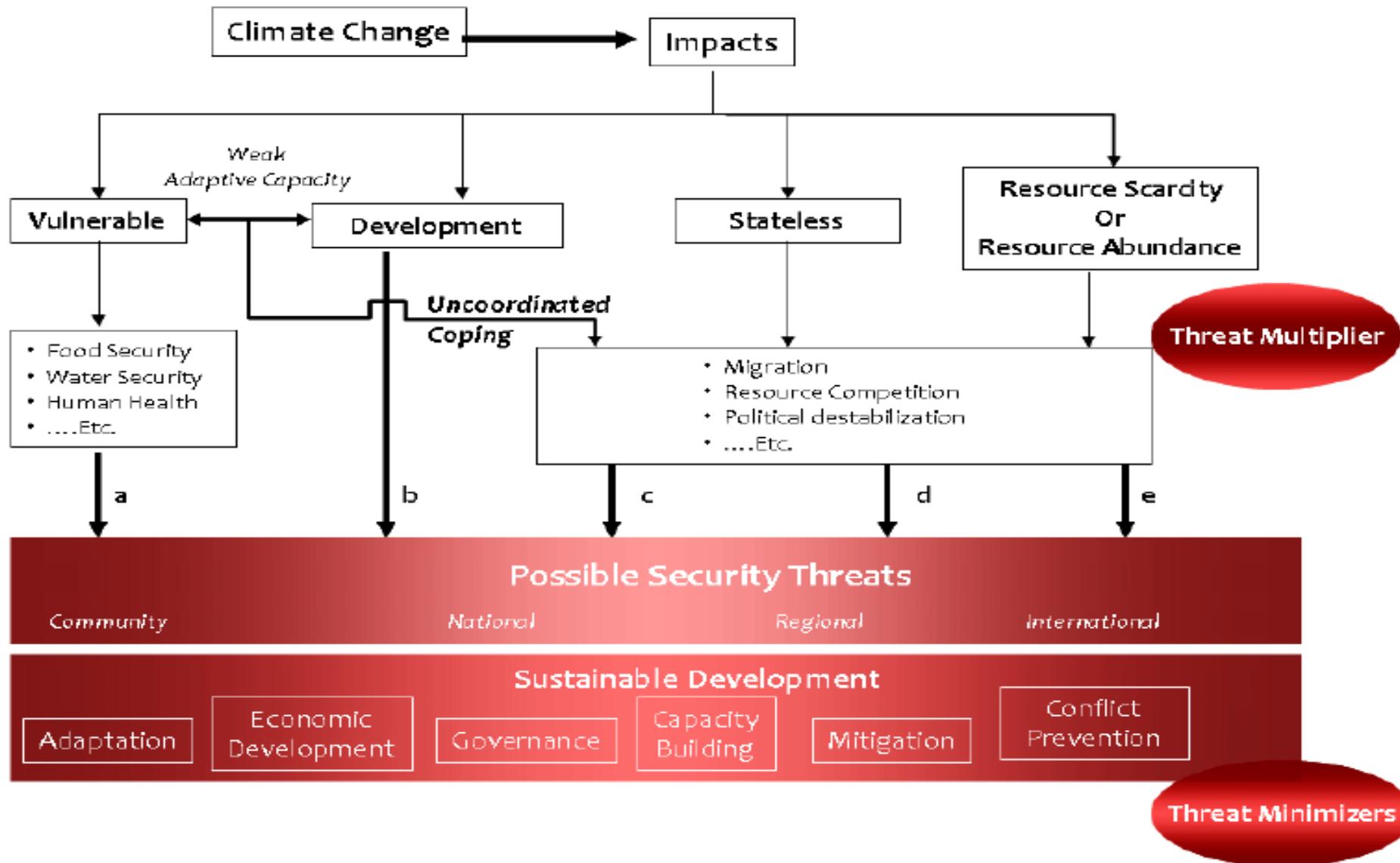
b) Environmental causes of conflict (environmental security debate)

c) Recent Debate: Global environmental & climate change & security

First conceptual phase (1983-1990):

- ❖ Impacts of wars on environment (Westing), 2001: UNEP-PCAU
- ❖ debate on environmental security as a national security issue (Ullman, 1983; Mathews, 1989, N. Myers, 1989)
- ❖ Debate on ecological security (Gorbachev) 1988 as international security concern
- ❖ **Second empirical phase (1991-2000):** case studies on environmental scarcity, degradation as causes of environmental stress & conflicts and environmental cooperation
 - ❖ Canadian (Th. Homer-Dixon)
 - ❖ Swiss (ENCOP, Bächler): (ENCOP)
- ❖ **Third Phase: methodological diversity (1995-?):** many directions, little synthesis
 - ❖ GECHS, state failure project (1999-2009)
 - ❖ Swiss project: mitigating syndroms of global change
 - ❖ Collier, Bannon, World Bank studies: abundance as conflict cause
 - ❖ PRIO: Civil War research
- ❖ **Fourth Phase: Proposal: Oswald/Brauch/Dalby (2009)**
 - ❖ Bring in: Global environmental change and natural hazard agenda: **transition from the Holocene to the Anthropocene: We are the threat!**
 - ❖ Human security perspective on environmental security
 - ❖ Gender considerations

5.1. Report of UN-Sec-General (11.9.2009)



5.2. Focus or Objects of Analysis

- **1st Environmental Security Debate:** (policy debate)
 - Brundtland (1987) Gorbachev (1988): **international security concern;**
 - Ullman, Myers, Mathews: **climate change national security threat**
 - NATO pilot project (1995-1999): US DoD and German BMU
- **2nd Environmental Security Debate:** (empirical research)
 - Homer-Dixon: environmental scarcity and stress resulting in conflict
 - Baechler/Spillmann: environmental scarcity, degradation and stress resulting in conflict or cooperation
- **3rd Environmental Security Debate:** diverse research focus

Climate Change and Security: 3 debates

- Climate change and international security (EU, UN, UK, D)
- Climate change and international security (USA, UK, etc.)
- Climate change and human security (GECHS, USN, IPCC)

6. Specific Focus of this Workshop

- **Impacts:** Environmental changes **impacting on or caused** by the European **cross-border energy supply** infrastructure;
- **Challenges:** Study and prediction of geohazards for **environmental security** regarding the European cross-border energy supply infrastructure;
- **Task:** Environmental and Infrastructure Monitoring
- **Tools: Remote sensing: monitoring** of natural environment & of the European cross-border energy supply infrastructure
- **Institutionalization:** Geoinformatic systems for providing environmental security of the European cross-border energy supply infrastructure;
- **Applications:** Specific features of integrated environment monitoring systems for the cross-border areas affected by major engineering structures (oil and gas pipelines, oil and gas production complexes, industrial and energy transmission facilities, etc.).

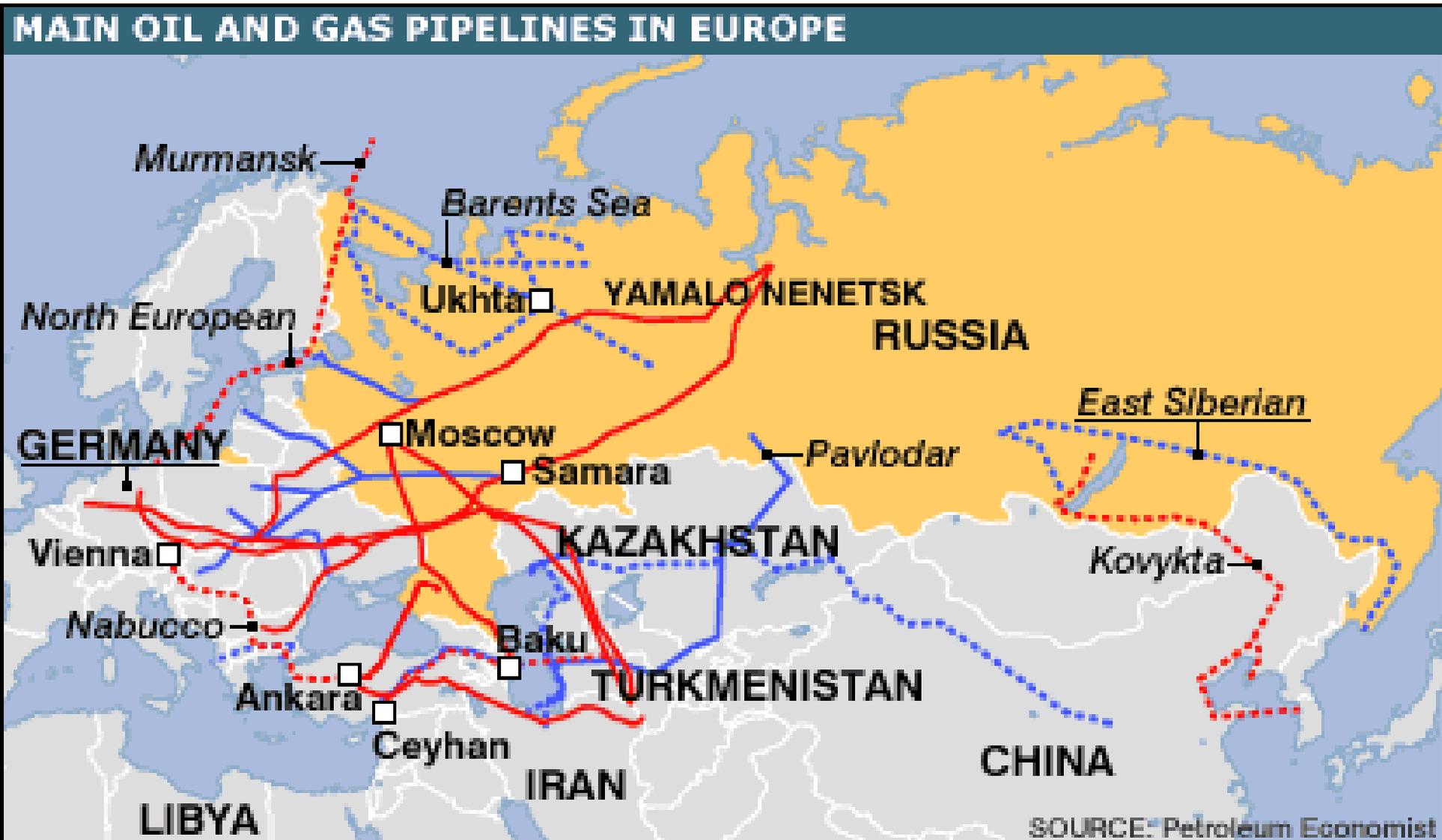
7. Environmental Security Challenges and Impacts of Globalization and GEC

- **Environm. security challenges of globalization:**
 - Non-state actors threatening energy infrastructure
 - Environmental impact of terrorist attacks on pipelines
 - Environmental hazards: forest fire etc.
- **Security challenges of physical effects of GEC:**
 - Temperature increase, precipitation change
 - **Sea-level rise & increase of natural hazards**
 - Coastal infrastructure
 - Geophysical: Earthquake, 2011 Tsunami: Fukushima
 - **Hydro-meteorological:**
 - heat wave,
 - forest fires (e.g. in 2010) threatening nuclear reactors in Russia?
 - Forest fires may: threaten oil and gas pipelines?

7.1 Object of Security Concern & Protection: European cross-boundary energy supply infrastructure

- **Object of Protection: European oil & gas infrastructures: Networks: Oil and Gas Pipelines & Electricity Transmission Grid** (e.g. of Renewables, DESERTEC Project)
 - Oil pipelines (from Russia)
 - Gas pipelines (e.g. from North Sea, Russia and Algeria)
 - European electricity Grid Initiative Roadmap (2010-2018)
- **Cause of the Threat:**
 - **Deliberate:** attack by state and non-state actors
 - **Nonintentional:** Environmental hazards or accidents
 - Long-term: climate change related: sea-level rise, natural hazard
 - Short-term: accidental
- **What is to be protected?**
 - **Installations: all plants** (electricity generation & transmission network)
 - **Installations for transmission of oil, gas (hydrocarbons)**
 - **electricity: trans-European networks based on renewables**

7.1 European & Asian Oil & Gas Pipelines



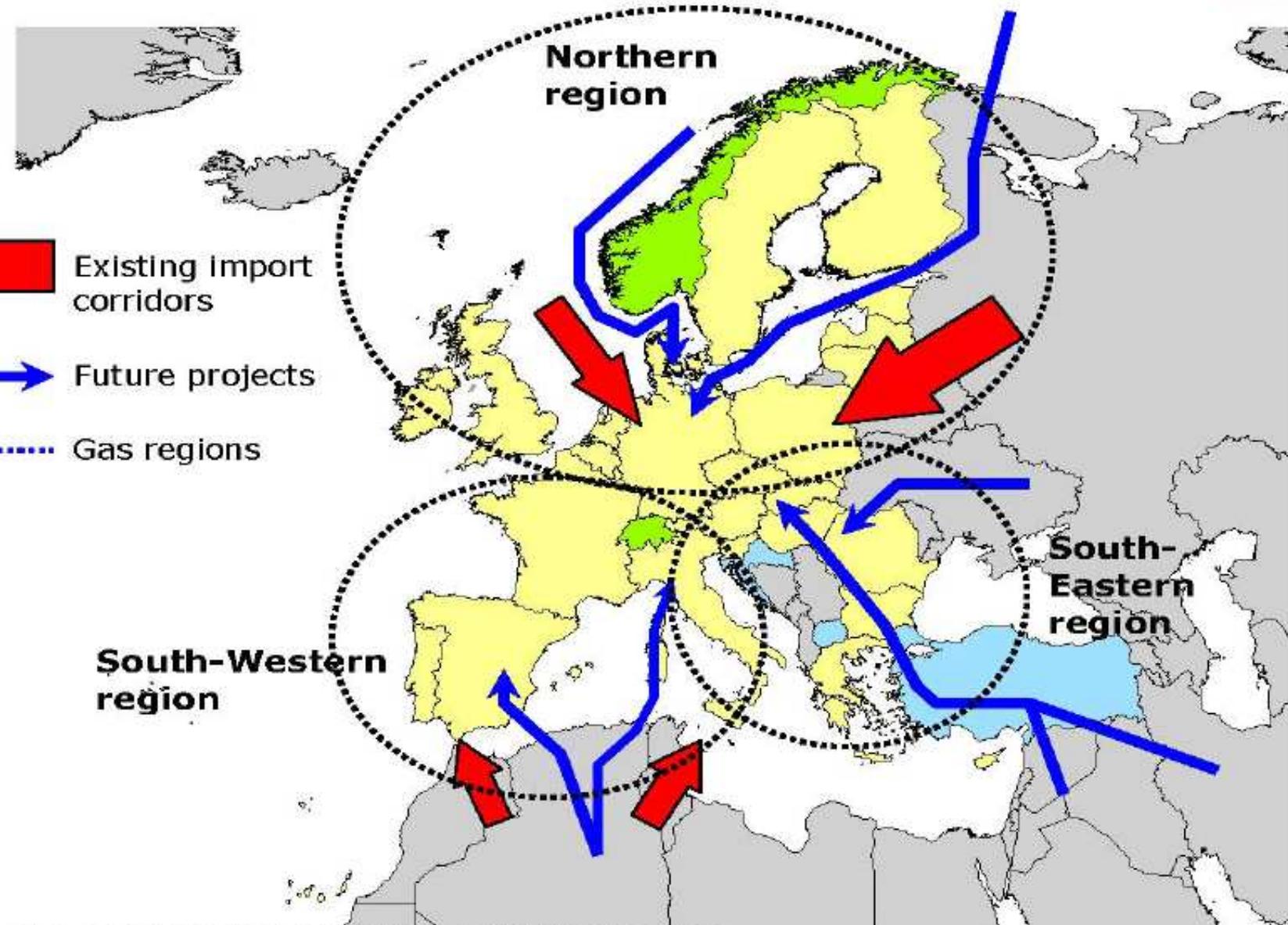
— Existing oil pipelines

— Existing gas pipelines

Existing and Planned Natural Gas Pipelines to Europe



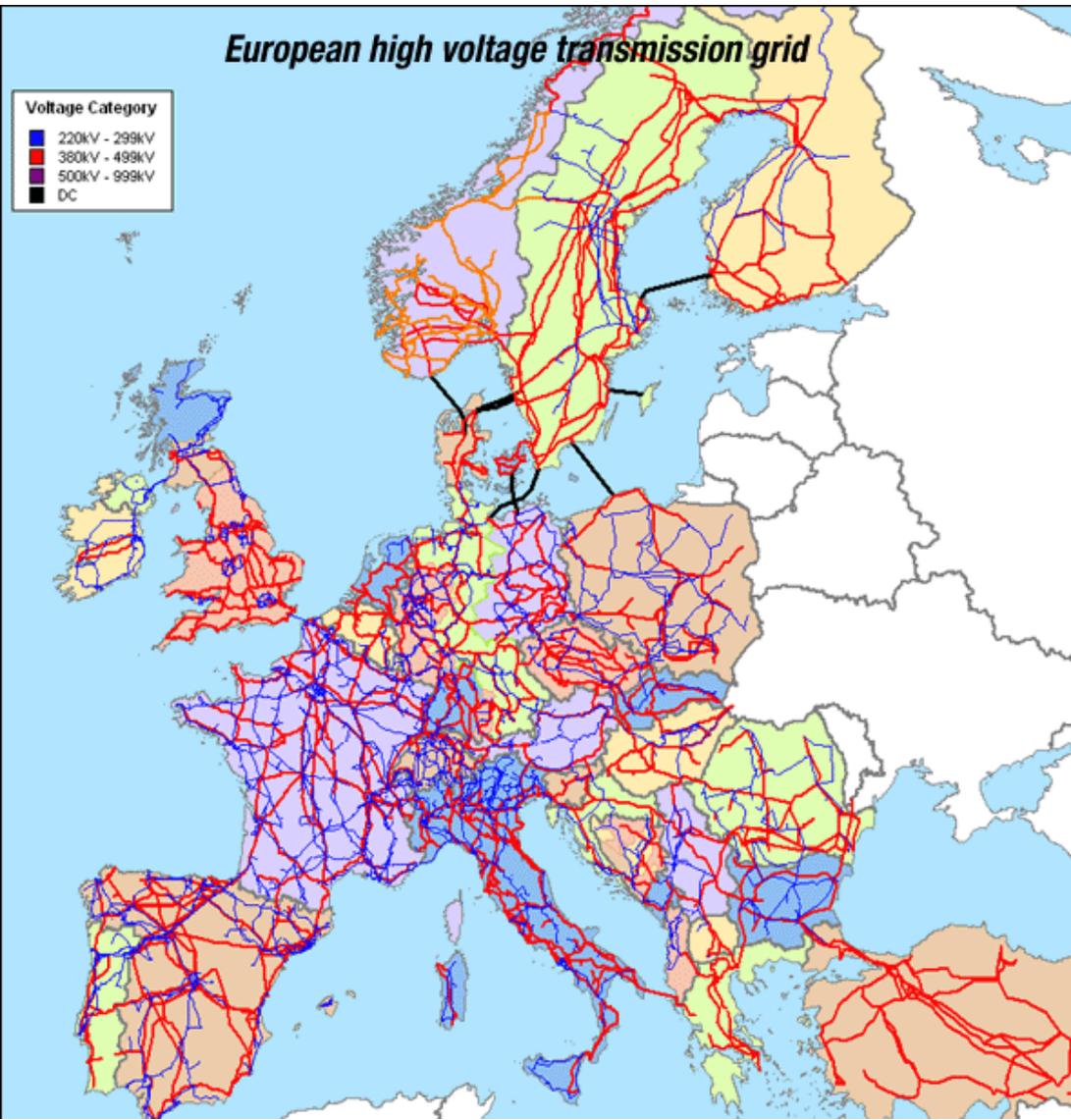
7.4 Existing and future gas pipelines



Source: COWI produced, background from COWI mapping division.



7.6. Trans-European Electricity GRID

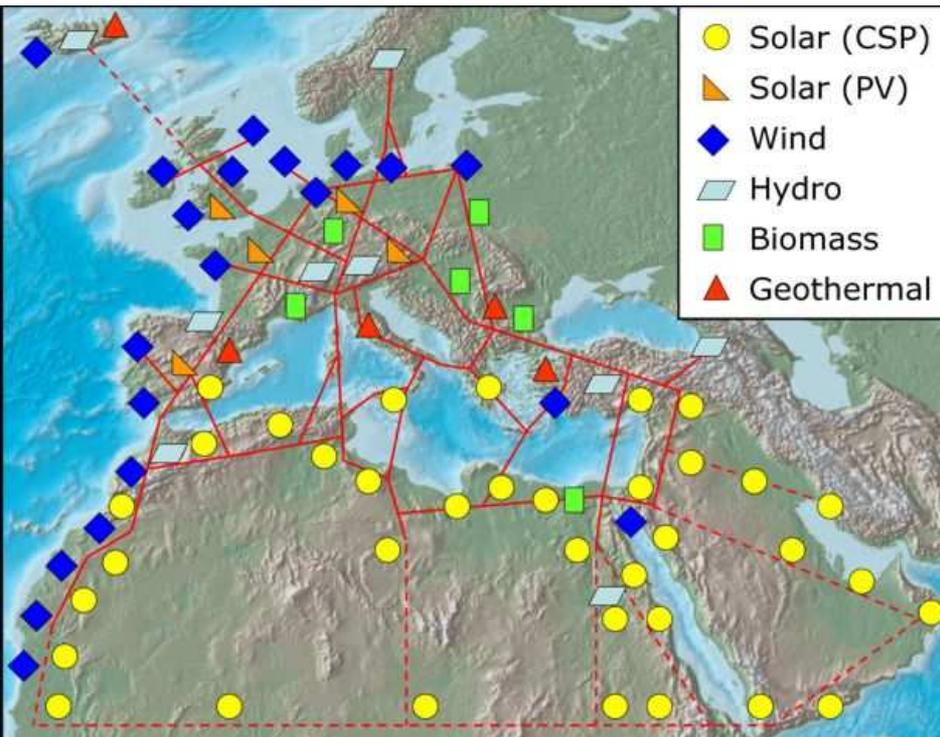


- **High-voltage direct current (HVDC)**



7.7. Renewable Electricity Grid Proposals: From TREC (2003) to DESERTEC (2009)

Trans-Mediterranean Renewable Energy Cooperation (TREC) to DESERTEC



DESERTEC Project established in July 2009
Goal: 2050 15% of European electricity
from renewables in North Africa, 500 bn €

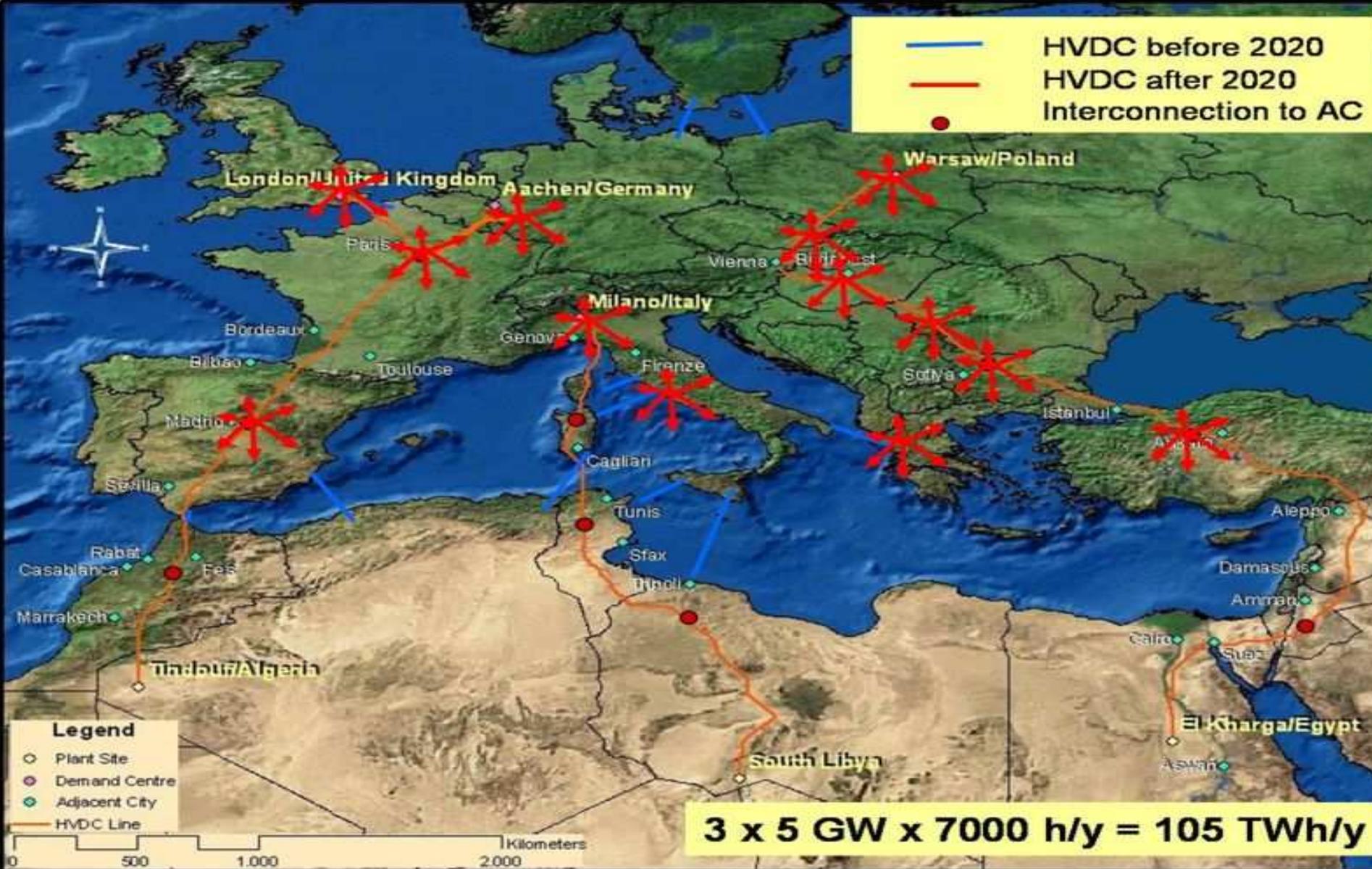
Concentrating Solar Thermal Power (CSP):

- Solar heat storage for day/night operation
- Hybrid operation for secured power
- Power & desalination in cogeneration

Sketch of High-Voltage Direct Current (HVDC) grid: Power transmission losses from the Middle East and North Africa (MENA) to Europe less than 15%.

Power generation with CSP and transmission via future EU-MENA grid: 5 - 7 EuroCent/kWh
 Various studies and further information at www.DESERTEC.org

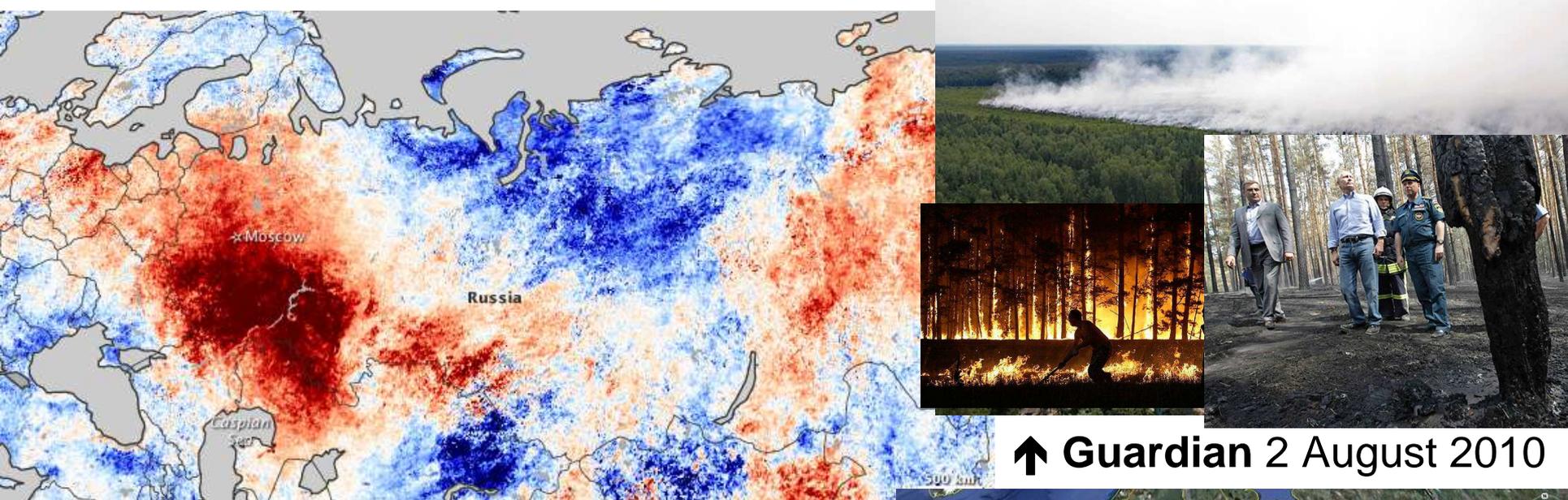
7.8. EU-MENA: existing & planned High Voltage Direct Current (HVDC) transmission lines before & after 2020



8. Environmental Security Tasks & Tools

- **Goal of the Multinational Security Effort:**
 - **Vulnerability of oil, gas and electricity infrastructure**
 - terrorist attacks (pipelines, redundancy)
 - **Natural hazards** (earthquakes, floods, **forest fires**, sea-level rise)
 - **Policy Response**
 - **Proactive:** Climate-change related
 - Long-term: active climate policy
 - Medium term: mitigation & adaptation
 - **Preventive:**
 - Protection of infrastructure against hazards and attacks
 - **Reactive:**
 - Early Warning
 - Disaster Response
 - » Monitoring
 - » Early Warning

8.1. Forest Fire in Russia in 2012: An ES threat to cross-border energy infrastructure?



A NASA map showing temperature anomalies for the Russian Federation covering July 20 to 27, 2010. The data compares temperatures collected from 2000 through 2008 for the same week. (Credit: NASA)

Did the forest fires threaten the cross-border oil and gas infrastructure in Europe?



8.2. Environmental Security Tools

- **Terrorist attacks** (pipelines, redundancy)
 - Early Warning
 - Human Intelligence
 - Infrastructure monitoring from outer space (satellite)
 - Justice and Home Affairs
- **Natural hazards**
 - earthquakes,
 - Weather forecasts: Storms and floods,
 - Satellite monitoring: forest fires,
 - Long-term: sea-level rise

9. Environmental Security

Application & Institutionalization

- **Applications:**
 - By task (early warning, disaster response)
 - By commodity (oil, gas and electricity specific)
 - Oil
 - Gas
 - Electricity
 - Hydrogen
 - Renewables (Biogas, biofuel)
- **Institutionalization:**
 - International (IEA)
 - European level (OSCE, EU-27, NATO & neighbourhood)
 - Sub-European level
 - Western Europe (EU-27)
 - Eastern Europe (Russia, Ukraine, Belarus)
 - Southeastern Europe (Albania, Ex-Yugoslavia, Turkey)
 - Mediterranean (EU-27, EMP or Union for the Mediterranean)

9.1 National Institutions & International Organizations

- National level
- International level
 - IEA (OECD countries): oil reserves & infrastructure security
 - OSCE: basket 2 (Europe & Asia: Russia Federation)
 - EU
 - DG energy (European oil, gas networks, electricity grid)
 - DG environment (natural hazards)
 - Union for the Mediterranean
 - Pilot project: European Solar Plan
 - Pilot project: coping with natural disasters
 - NATO
 - Science division (workshops)
 - Energy Security Section

9.2. NATO on Energy Security

- Energy security was included as a new topic in the [NATO Riga Summit agenda](#) (art. 45) in November 2006.
 - NATO leaders recognize that the disruption of the flow of vital resources could affect Alliance security interests. At the Bucharest Summit in April 2008, the Allies noted a report on “[NATO’s Role in Energy Security](#),” which identifies guiding principles and outlines options and recommendations for further activities. These were reiterated at the [Strasbourg-Kehl Summit in April 2009](#) and the [Lisbon Summit in November 2010](#).
- The Bucharest report identified the five following key areas where NATO can provide added value:
 - information and intelligence fusion and sharing;
 - projecting stability;
 - advancing international and regional cooperation;
 - supporting consequence management; and
 - [supporting the protection of critical infrastructure](#).
- Consultations since Bucharest Summit on depth & range of NATO’s involvement in this issue. Both within the Alliance and [with NATO’s partner countries, a number of practical programmes, workshops and research projects](#), are ongoing.
- [New Strategic Concept](#) (November 2010) tasks NATO to "develop the capacity to contribute to energy security, [including protection of critical infrastructure and transit areas and lines, cooperation with partners, and consultations among Allies on the basis of strategic assessments and contingency planning.](#)"

10. Conclusions: Potential Contribution of Integrated Environment Monitoring Systems for Cross Boundary Energy Supply Infrastructure

• Step 1: Regime Formation & Effectiveness

- **Stephen Krasner (1982)**: defined International Regimes as
 - “Implicit or explicit principles, norms, rules and decision-making procedures around which actors’ expectations converge in a given area of international relations“.
- Regimes "are more specialized arrangements that pertain to well-defined activities, resources, or geographical areas and often involve only some subset of the members of [international society](#)", (Oran R. Young, 1989)

• Step 2: International Institution Building (Initiative)

- **ENVSEC initiative** (OSCE, UNEP, UNDP, NATO)
- **Environment & Energy Infrastructure Initiative (EII)**: (IEA, OECD, OSCE, UNEP, EU, NATO)
 - **Geography**:
 - a) Europe (EU-27), b) OSCE Europe & Asia,
 - c) Europe (EU-27) & MENA or d) OSCE Europe and MENA region (observer)
 - Dialogue, research co-operation and information exchange
 - Routines for cooperation on early warning and rapid response
 - Formation of a regime or an institution (organization)

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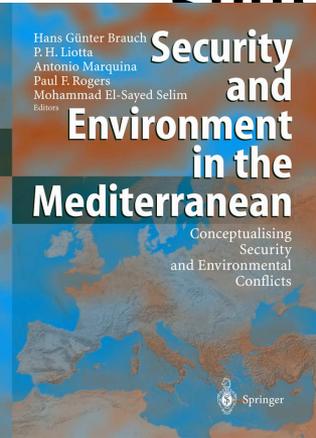
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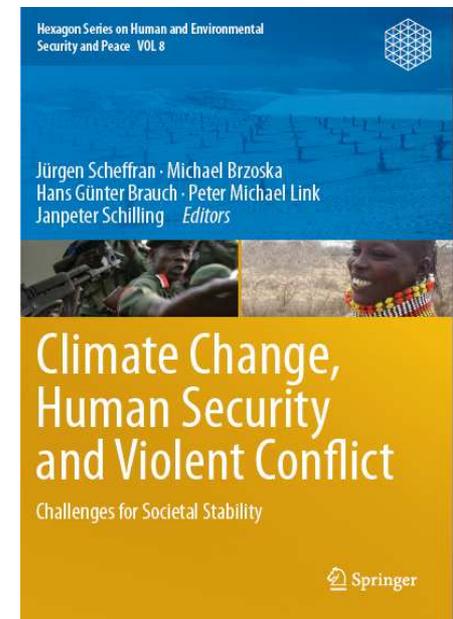
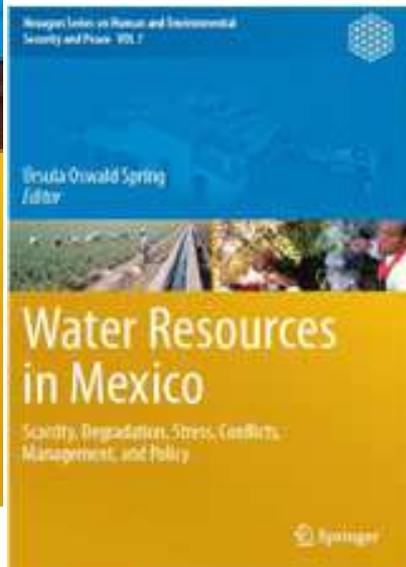
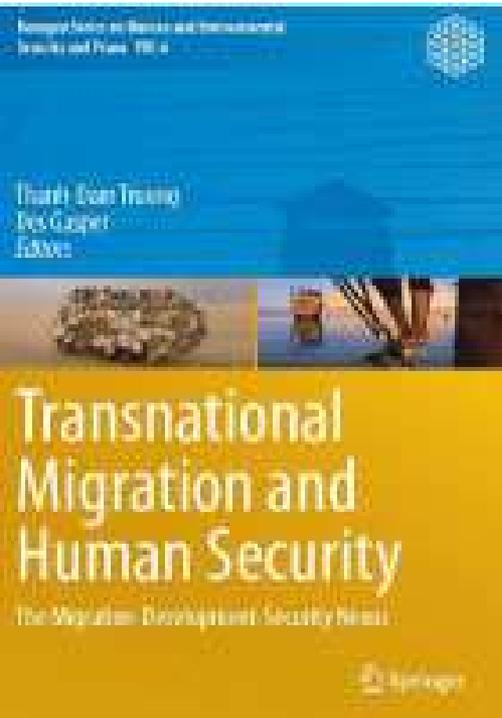
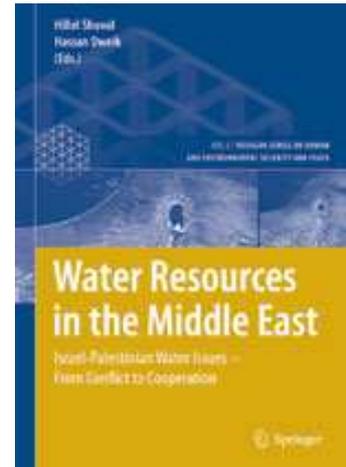
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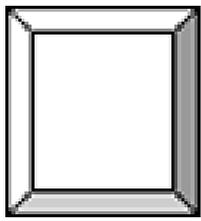
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Truong, Thanh-Dam; Bergh, S.I.; Gasper, Des; Handmaker, J. (Eds.): Migration, Gender and Social Justice - Perspectives on Human Security. HEX liX (Heidelberg – Dordrecht – London – New York: Springer, 2012).

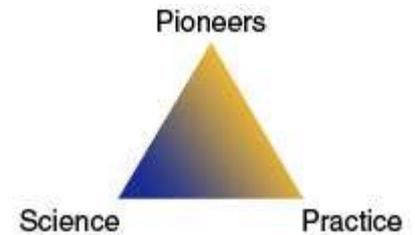
Czeslaw Meszjasz: *Stability, Turbulence or Chaos? Systems Thinking and Theory and Policy of Security*. HEX X (Berlin – Heidelberg – New York: Springer-Verlag, 2011), in planning





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