Territorial Intelligence of vulnerability systems 2 - Sustainable modelling of globalization challenge.

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TERRITORIAL INTELLIGENCE OF VULNERABILITY SYSTEMS 2– SUSTAINABLE MODELLING OF GLOBALIZATION CHALLENGE

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ABSTRACT: A PROGRAMMING MANUAL TO VULNERABILITY

Globalization as progress of economic development has increased population socioeconomical vulnerability when unequal wealth distribution within economic development process constitutes the main rule, with widening the gap between rich and poors by environmental pricing. Econological vulnerability is therefore increasing too, as dangerous substance and techniques should produce polluted effluents and industrial or climatic risk increasing (Woloszyn, Quenault, Faburel, 2012). To illustrate and model this process, we propose to introduce an analogical induction-model to describe both vulnerability situations and associated resilience procedures. At this aim, we first develop a well-known late 80's model of socio-economic crack-up, known as "Silent Weapons for Quiet Wars", which presents economics as a social extension of natural energy systems. This last, also named "E-model", is constituted by three passive components, potential energy, kinetic energy, and energy dissipation, thus allowing economical data to be treated as a thermodynamical system. To extend this model to social and ecological sustainability pillars, we propose to built an extended E(Economic)-S(Social)-O(Organic) model, based on the three previous components, as an open model considering feedbacks as evolution sources. An applicative illustration of this model will then be described, through this summer's american severe drought event analysis.

SILENT WEAPON AS A MODEL OF UNINTELLIGENCE SERVICE

Silent Weapons for Quiet Wars was claimed beeing uncovered quite by accident on July 7, 1986 when an employee of Boeing Aircraft Co. purchased a surplus IBM copier for scrap parts at a sale (Cooper, 1991). Silent weapons technology is an outgrowth of a simple idea discovered, succinctly expressed, and effectively applied by the quoted Mr. Mayer Amschel Rothschild, who discovered the missing passive component of economic theory known as economic inductance. Currency, or deposit loan accounts, has the required appearance of power that could be used to induce people into surrendering their real wealth in exchange for a promise of greater wealth (interests).

When applied gradually, the public adapts to its presence and learns to tolerate its encroachment on their lives until the pressure (psychological via economic) becomes too great and they crack up, depending on their resilience capacity.

THE E S O LOCAL/GLOBAL TRANSITION PARADIGMATIC MODEL; ECONOMY AND ENERGY CONCEPTS

In the study of energy systems, three elementary concepts, potential energy, kinetic energy, and energy dissipation, constitute the base of pure physical counterparts called "passive components".

In the science of physical mechanics, potential energy is associated with a physical property called elasticity or stiffness, and can be therefore represented by a stretched spring. In electronic science, potential energy is stored in a capacitor instead of a spring, which property is called capacitance.

Second passive component, kinetic energy, is associated with a physical property called inertia or mass, and can be represented by a flywheel in motion. In electronic science, kinetic energy is stored in an inductor, a magnetic field, which property is called inductance. Endly, energy dissipation is associated with a physical property called friction or resistance, thus converting energy into heat.

Model E assumes that economics is only a social extension of a natural energy system, also constituted by its three passive components. To extend this model to social and ecological sustainability pillars, we claim that Social and Ecological pillars could therefore be defined as subsystems based on the three previous passive components, which constitute a global open sustainability model, as seen figure 1:.

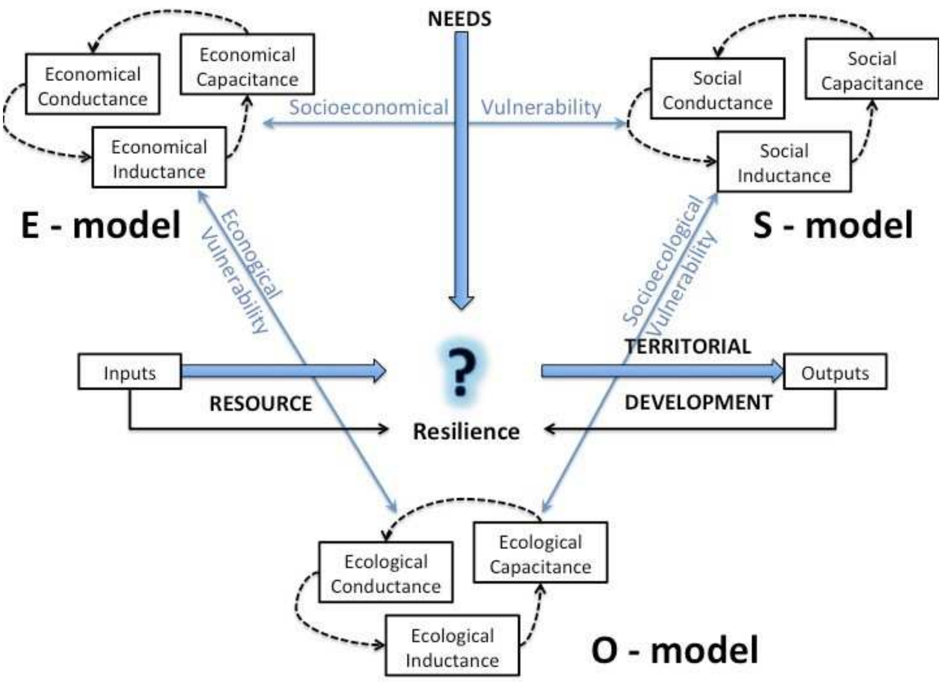

Figure 1: Open-analogical model of sustainability involving territorial intelligence concepts

ECONOMIC INDUCTANCE (MODEL E *SILENT WEAPON*)

An electrical inductor has an electric current as its primary phenomenon and a magnetic field as its secondary phenomenon (inertia). Corresponding to this, an economic inductor has a flow of economic value as its primary phenomenon and a population field as its secondary field phenomenon of inertia. This public inertia is a result of consumer buying habits, expected standard of living, etc., and describes generally a self-preservation process.

SOCIAL INDUCTANCE (MODÈL S *SOFT CONDITIONING*)

The social welfare program is nothing more than an open-ended credit balance system which creates a false capital industry to give nonproductive people a roof over their heads and food in their stomachs. Analogy considers social implying cooperation action as its primary phenomenon and integration process as its secondary field phenomenon of inertia. As in every social system approach, stability is achieved only by understanding and accounting for human nature (action/reaction patterns).

ECOLOGIC INDUCTANCE (MODEL O *ORGANIC ERADICATION*)

Ecosystem, involving interaction between air (athmosphere), water (hydrosphere), ground (litosphere) and life (biosphere), is preserved within natural cycle between natural life cycle between producers (vegetals), consumers (living organisms) and de-composers (chimical materials). Ecologic inductor considers ecological management as its primary phenomenon and ecosystemic interactions as its secondary field phenomenon. A further description is given following figure 2:

Property (Entropy class)	Economical (Model E)	Social (Model S)	Ecological (Model O)
Capacitance (Potential)	Capital (stocks) Compétences Confiance	Cultures, Social capital (actors & networks…)	Biosphère (Biotope +biomasse) Etat d'être (bien-, mal-)
Conductance (Dissipative)	Flux (Goods) Services production	Networking Cultural action Cooperation	Eco-actions Gestion environnementale (Ecological management)
Inductance (Kynetical) (= variation capacitance)	Resultance (valeur ajoutée, retranchée…)	Integration - différenciation Radicalisation	Ecosystemic interactions Fertilisation Désertification

Figure 2: The three passive components of the sustainability pillars

Within those analogical models, if capacitance exceeds inductance, a leading power factor will result which could result in uncontrolled economic/social overflows and harmonic problems occurs, driving the system to crisis.

CASE STUDY: HISTORICAL DROUGHT IN UNITED STATES

The United States is grappling with a widespread drought this summer as severe as the historic drought of the 1950s. The US Department of Agriculture (USDA) reported that 55 percent of the pasture and rangeland was in very poor condition. On July 25, the USDA designated even more drought disaster areas, bringing the total for the 2012 crop year to 1369 counties in 31 states (Figure 3).

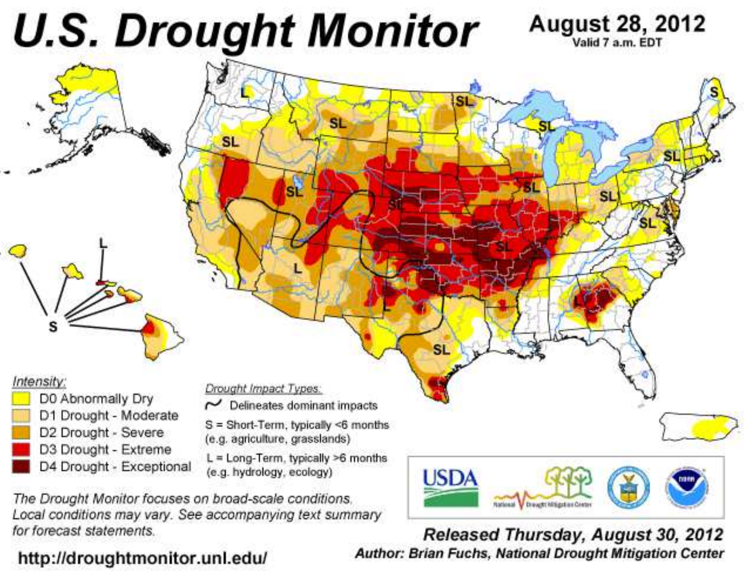

Figure 3: U.S. Drought Monitor (Reuters, 2012)

INDUCED EFFECTS FROM O (ORGANIC-ECOLOGIC-CLIMATE) -> TO E (ECONOMICS)

With more than 40% of US agricultural land now in extreme or exceptional drought, "Prices of both corn and soybeans soared to all-time highs, with corn climbing more than 50 percent in the past four weeks alone due to the worsening drought, squeezing livestock producer margins." (Reuters, 2012).

Property (Entropy class)	Economical (Model E)	Social (Model S)	Ecological (Model O)
Capacitance (Potential)	Stocks decreasing Price Uncertainty	Governance failure	Climate stability/ change
Conductance (Dissipative)	**+26% for corn and +41% for wheat prices**	Hunger Line Powerty	US Severe Drought **40% of US agricultural land**
Inductance (Kynetical)	Market deregulation	Social risk perception	High temperatures Lack of water

Figure 4: The three passive components of the U.S. climate event

As said Bruce Williams, Kansas-Phillipsburg agricultural cooperative director: *"since 31 years* *doing this business, I never saw such prices fluctuations"* (Reuters, 2012), it is not the price level that borrows producers, but their fluctuation periods, which have passed from seasonal (between summer and winter, namely) to daily frequency, which causes market uncertainity by unpredictible price variations. Thus, entropy of the whole E S O system is collapsing, implying a global crisis risk in agri-food sector as well.

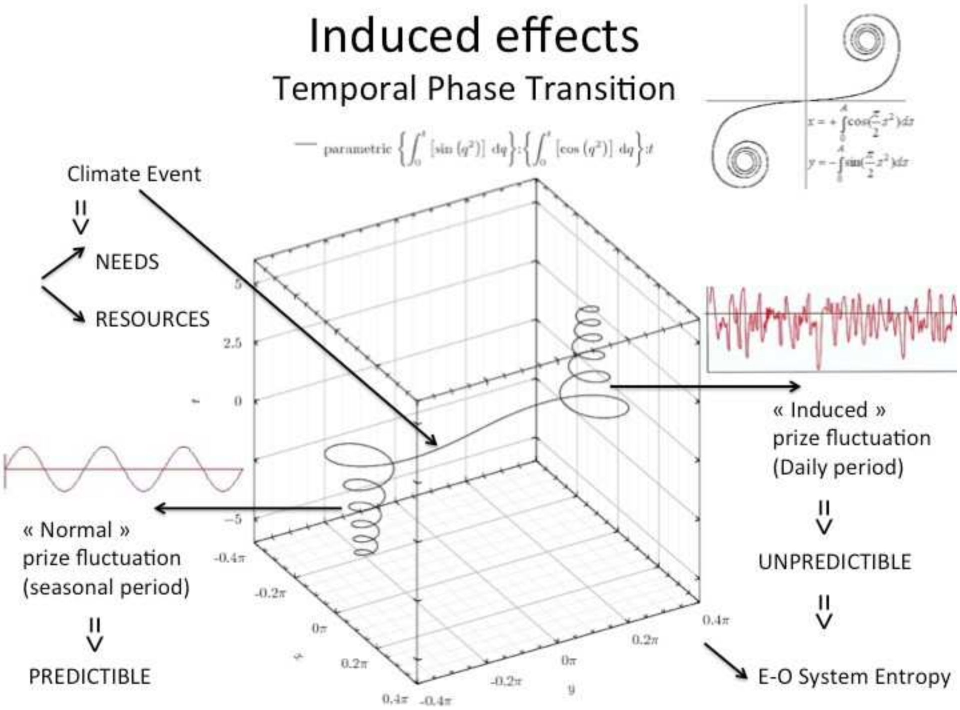

Figure 5: Temporal Phase Transition of E-O System

Figure 5 illustrates the temporel phase transition between climate event and socio-economical outcomes. Severe drought of United States has immediately impacted the agricultural prices, with an incresing of +26% for corn and +41% for wheat at the international market.

With the ongoing drought expected to destroy or damage a portion of the field corn crop in a number of States, increase in the farm price of corn affects the price of other crops, such as soybeans, and other inputs in the food supply such as animal feed.

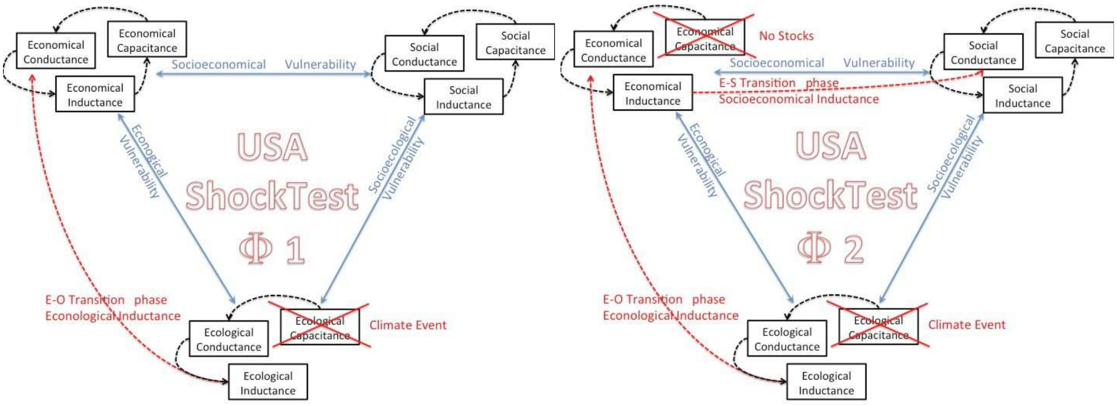

Figure 6: First (Organic-Economic) induction effect: phases 1&2

This first (Organic-Economic) induction effect sawn figure 6 will then be followed with a second (Economic-Social) induction effect (Figure 7), thus squaring the vulnerability-sustainability triangle to enter a first induction phase leading to global crisis emergence.

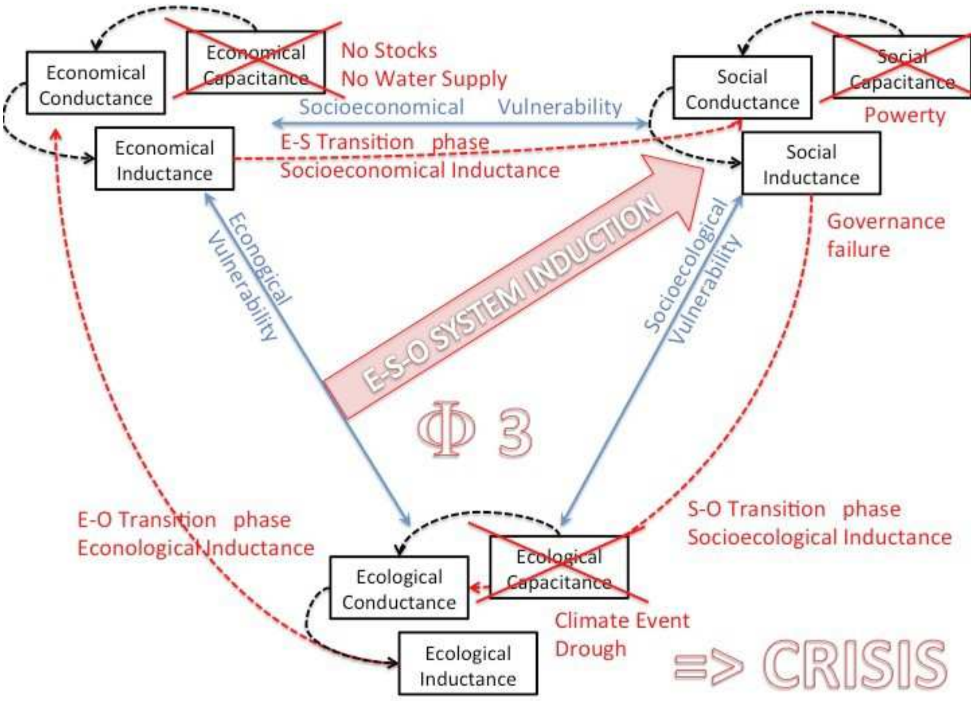

Figure 7: Second (Economic-Social) induction effect: phase 3

While drought planning and mitigation responsibilities lie largely at the state and local level, the federal government also provides some drought planning assistance.

RESILIENCE TO DRAUGHT? GOVERNANCE RESPONSES

As illustrated figure 7, when a drought is declared for a locality or region, U.S. Secretary of Agriculture sets in motion a series of alerts, recommendations, activities, and possible restrictions at the local, regional, or state level, depending on the drought length and severity. Ultimately, a multi-year severe drought could initiate a federal response and transfer of federal dollars to the affected area.

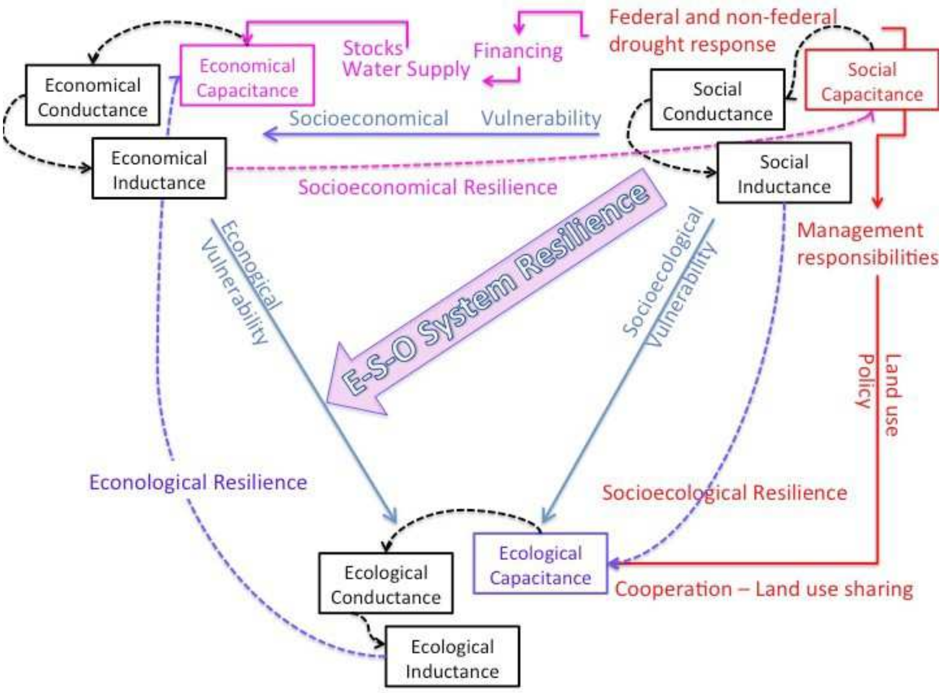

Figure 8: E S O System Resilience applied to U.S. 2012 Drought

In response to the 2012 drought, USDA also has taken a variety of administrative actions. For example, it reduced the interest rate for emergency loans from 3.75% to 2.25%, a smaller reduction (10% instead of 25%) on rental payments, or the purchase of up to $170 million in livestock and fish products to help ease the financial effects of drought on meat and catfish producers. (Shields, 2012). Congress may evaluate whether current federal practices could be supplemented with actions to coordinate, prepare for, and respond to the unpredictable but inevitable occurrence of drought. In passing the National Drought Policy Act of 1998 (The National Drought Policy Act of 1998, P.L. 105-199), U.S. Congress found an increasing need at the federal level to emphasize risk management, albeit unpredictability, of severe drought occurring (Leggett, 2012). It also may consider proposals to manage drought impacts, such as assisting localities, industries, and agriculture with developing or augmenting water supplies (Folger, Cody, & Carter, 2012).

By increasing economical capacitance of agricultural product units (farms), the federal government enable socioeconomical resilience to increase social capacitance, and therefore, to avoid social risks due to insufficient feeding supply (see "Trespassing the Hunger Line", in Woloszyn, 2011). If this governance action increase the inductive fields of socioeconomical actions, this short-term federal response has to be completed with long-term policy rules concerning land use, polutant emissions, and environmental preservation, in order to enable socioecological resilience to "square" the whole E S O system resilience. As a major consequence, to solve climate-related production problems, the way people act together through coordinated cooperative actions will be essential for eco-social capacitance long-term increasing, and therefore, resilience induction enabling. The message from climate scientists may soon be sinking into the nation's consciousness, to enable convergence between decision-making and cooperation actin to take care of our common biosphere.

A CONCLUSION

As fundamental thermodynamics claims that in response to warming, dry regions will become drier and wet regions will become wetter, one can observe that "the 'rich get richer' " mechanism is already operating, enlighting the close relationships between socioeconomical and socioecological vulnerability processes. The observed speedup of the water cycle is "double the response projected by current-generation climate models, and suggests that a substantial (16 to 24%) intensification of the global water cycle will occur" in a world that will be 2° to 3°C warmer (Durack, Wijffels, Matear, 2012). Severe drought can cause significant economic harm, by exacerbating water competition: uncertain availability of water is a greater risk to society than climate warming itself.

To manage this alea, reducing vulnerability through resilience process has to be a common goal between governments, organisations and citizens. Federal fragmented approach without local land uses acknowledgement can not assume that investment in drought preparation, mitigation, and coordination could produce significant socio-economical efficient outcomes. Therefore, response to systemic crisis like this recent USA drought has to be scaled from local level, at relatively short time scales (i.e. implying people's cooperative actions to bring immediate answers to water supply for agriculture) to global level, with implying long-term solutioning of the socioeconomical effects of climatic events, in order to reduce risk and uncertainty of climate change for vulnerable populations, through the increase of their resilience.

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