About farming and farmers in Northeast Thailand: Challenge issues on Sustainable Agriculture

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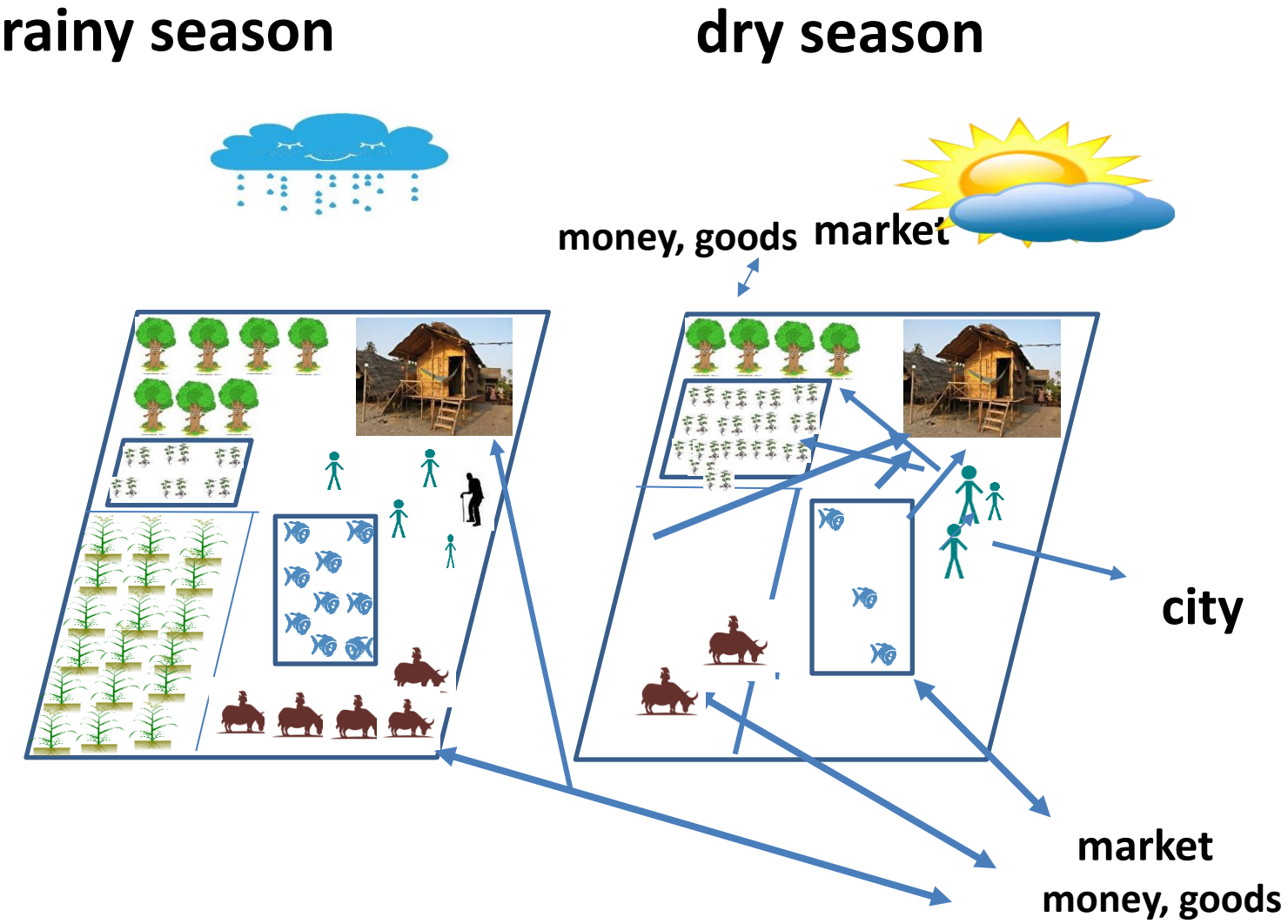
Challenge: Agricultural sustainability is a demand side concept, but why we usually deal with the supply side? Wrong footing?

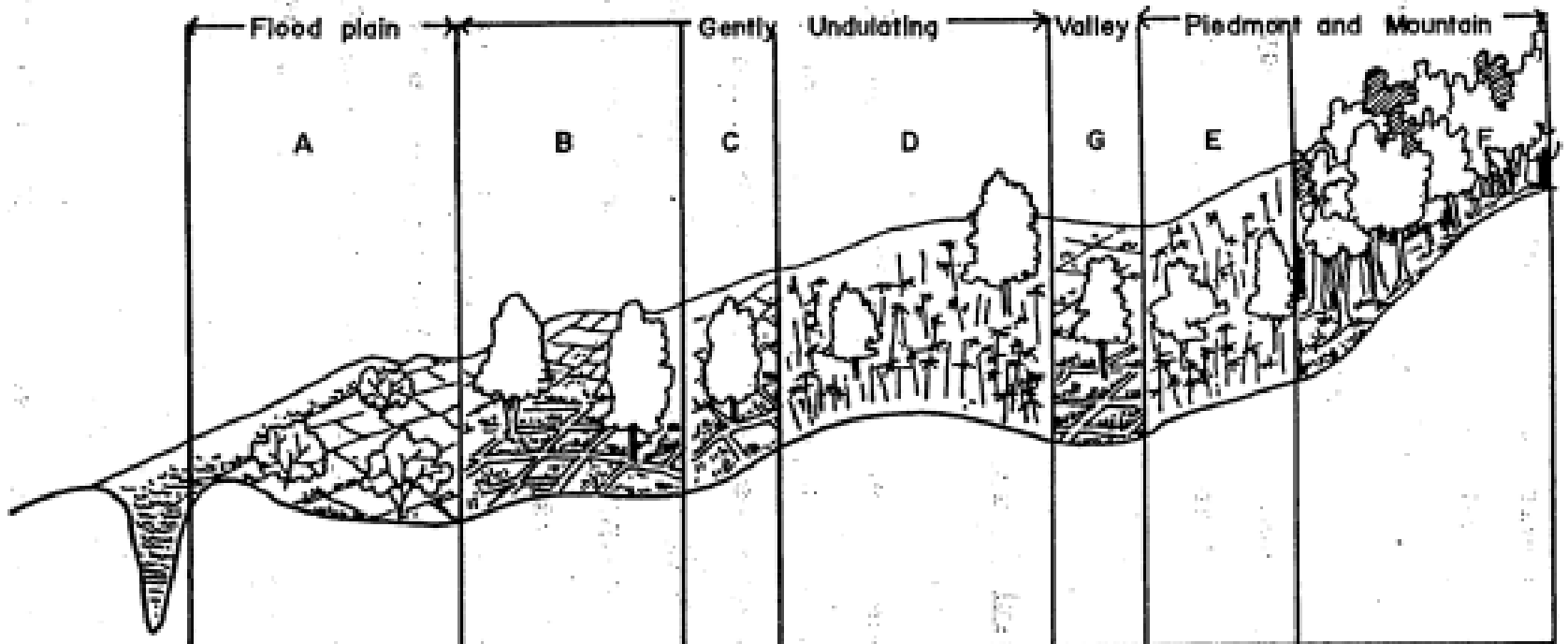
Topics

-Topography of NE(Northeast Thailand)
-General threats to sustainability
-General land use
-About people
-Agriculture and related activities (some transformations)
-Community enterprise
-Sustainability and sustainable agriculture
-Possible solutions to unsustainable agricultural practice



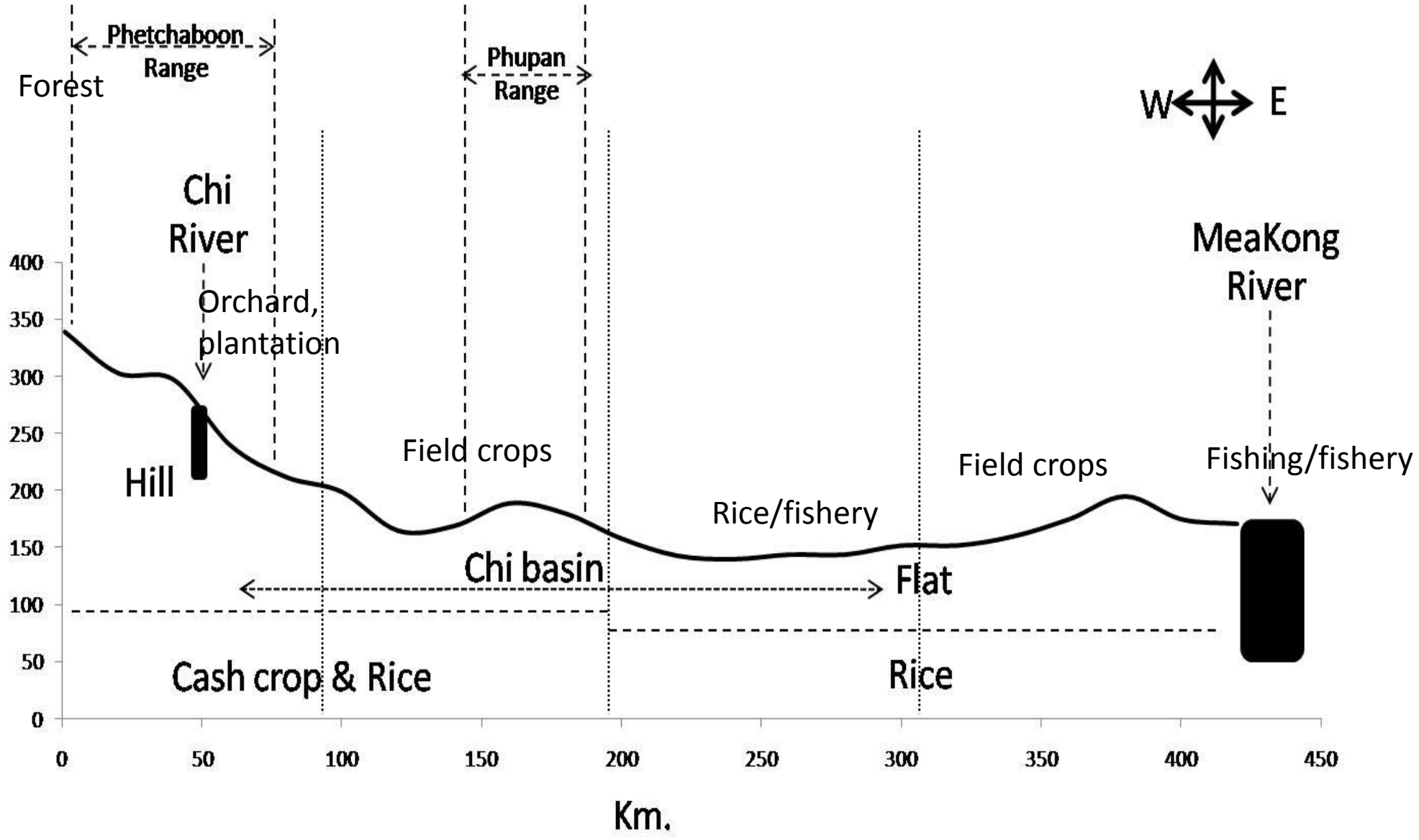
Concept of distribution on time and space, flow, decision making, dynamics

Land ecology of Thailand



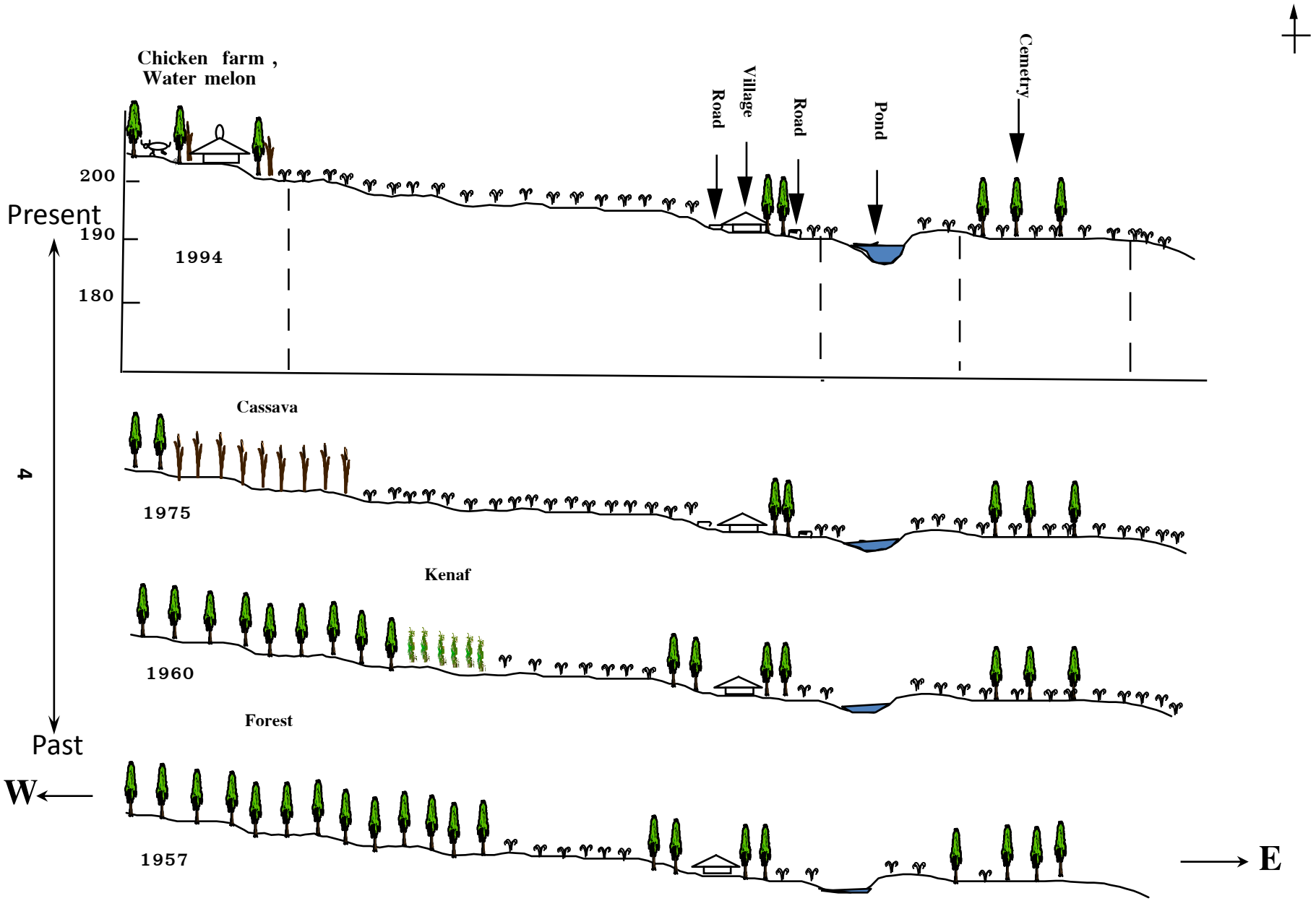
Landuse	-Shrub -Herbaceous	Paddy Field with Shrub	Paddy Field with sparse trees	upper paddy field	Upland crop with sparse trees	Paddy field	upland crop	-Forest -Degraded Forest
Land type	Levee	Flood Plain	Low terrace	Middle terrace	Middle and high terrace	valley	Piedment	Mountain and Hill
Soil	Loamy	Clayey	- Sandy loam - Saline soil - Sandy - Lateritic	sandy loam	- Sandy loam - Lateritic - Sandy	Sandy loam	-Sandy loam -Loam -Clayey	- Shallow soil - SKeletal soil
Drainage	Moderate	Poor	Poor	well	well	poor	very well	very well

หน่วยนิเวศพื้นที่ในภาพรวมของไทย Mongkolsawat et al 1988

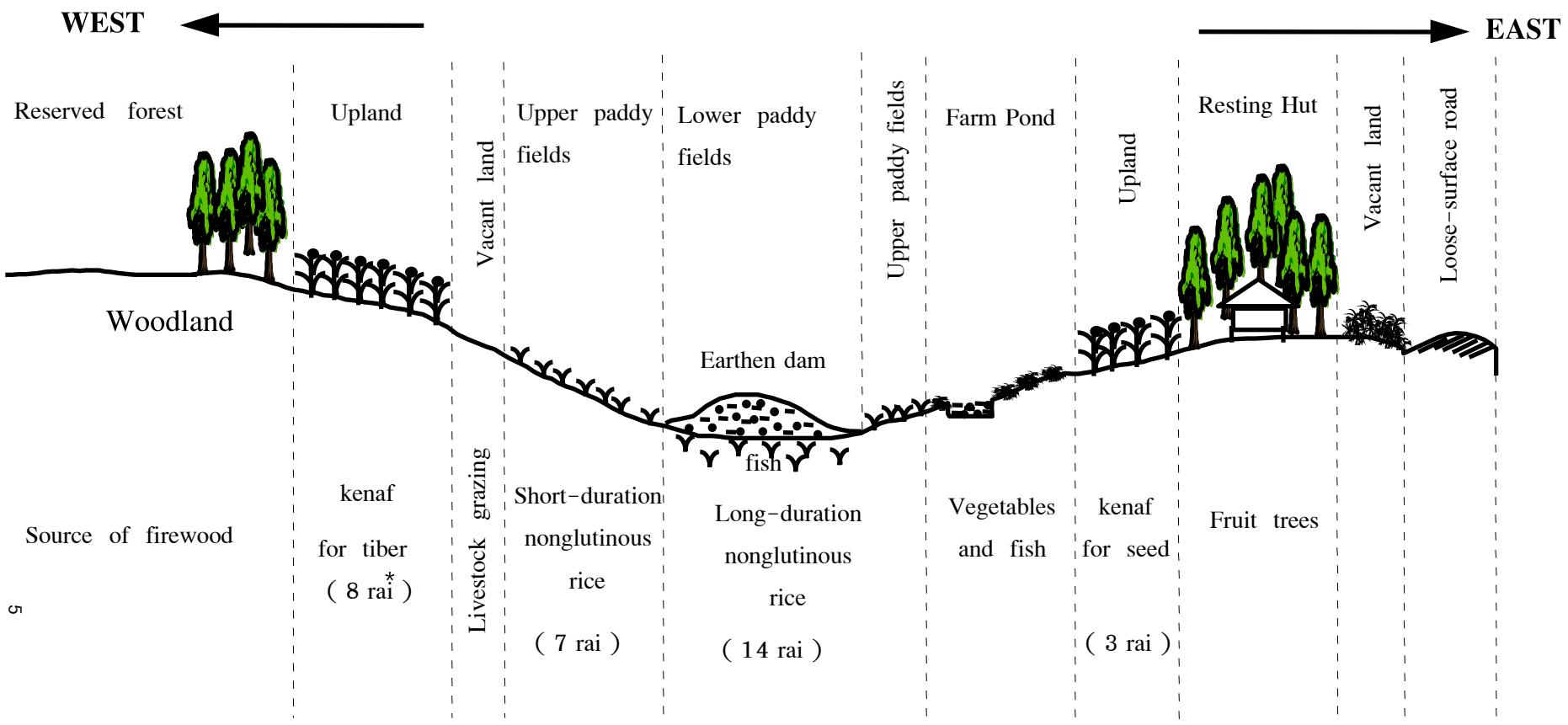


Northeast topography east-west

FIGURE 4 LANDUSE CHANGES WITH TIME



(KKU/RSA,1994)



Note 1 rai = 0.16 ha

Source : KKU-USAID Farming System Research Project,unpublished

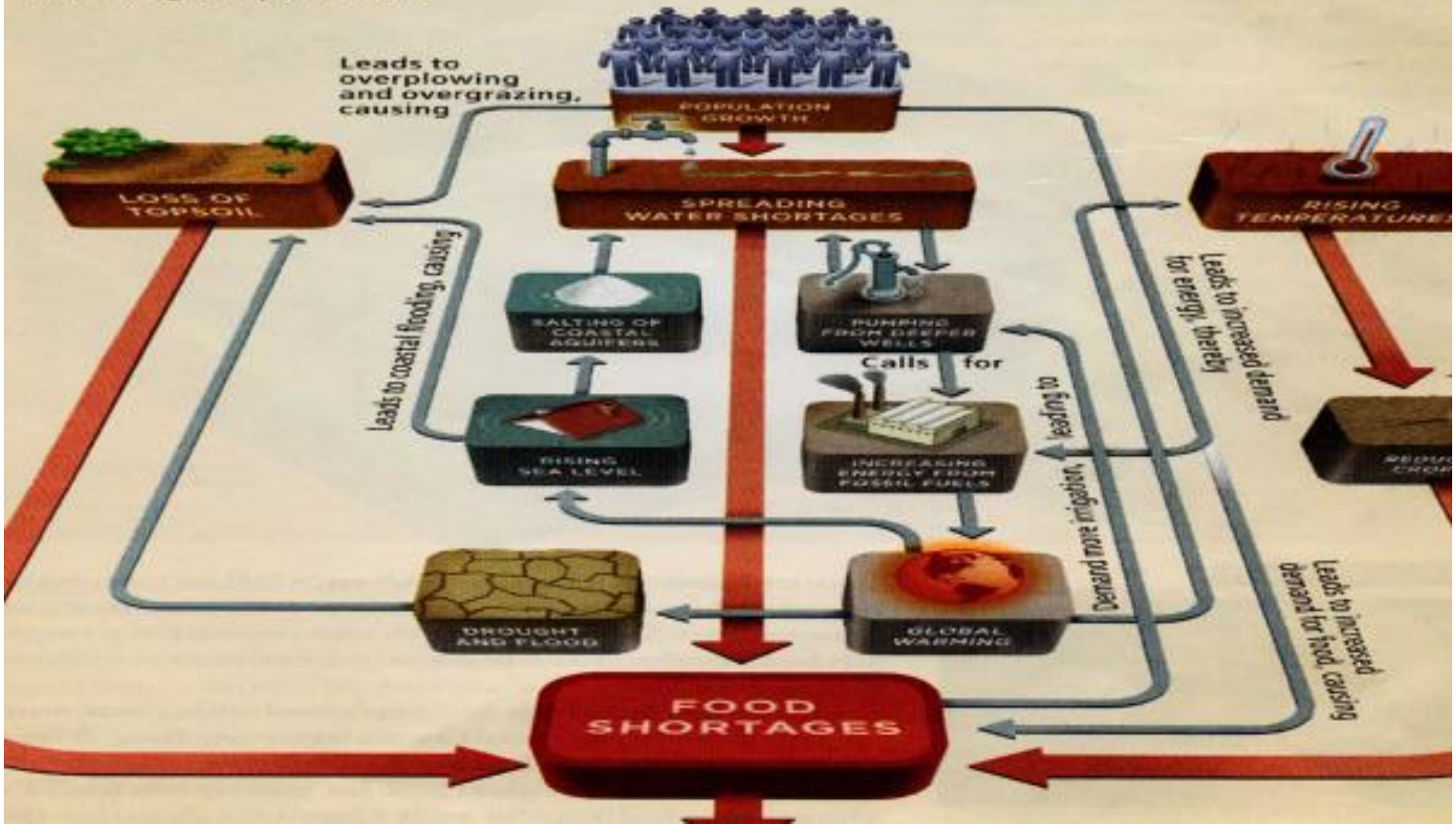
Transect of the undulating farm land of a Khon Kaen farm household

Mr.&Mrs. Kaewsai Family Field Map
surveyed on 21st April 2005
Group 1: Jeeva Gajamayaka
Somthong Bouphachanh
Endo- Hiroshi
N
S
To: Ban Nong Sa Village
Village Road
To: Huai Phok Nam Stream
Sugarcane
4rai
Normal Rice
0.5rai
Sandy soil
pond
Sticky rice
19.5rai
Clay soil
Sandy soil
pond
Vege table
Eucalyptus tree
Sandy Soil
clay soil
sandy soil

[CAUSES AND EFFECTS]

Key Factors in Food Shortages

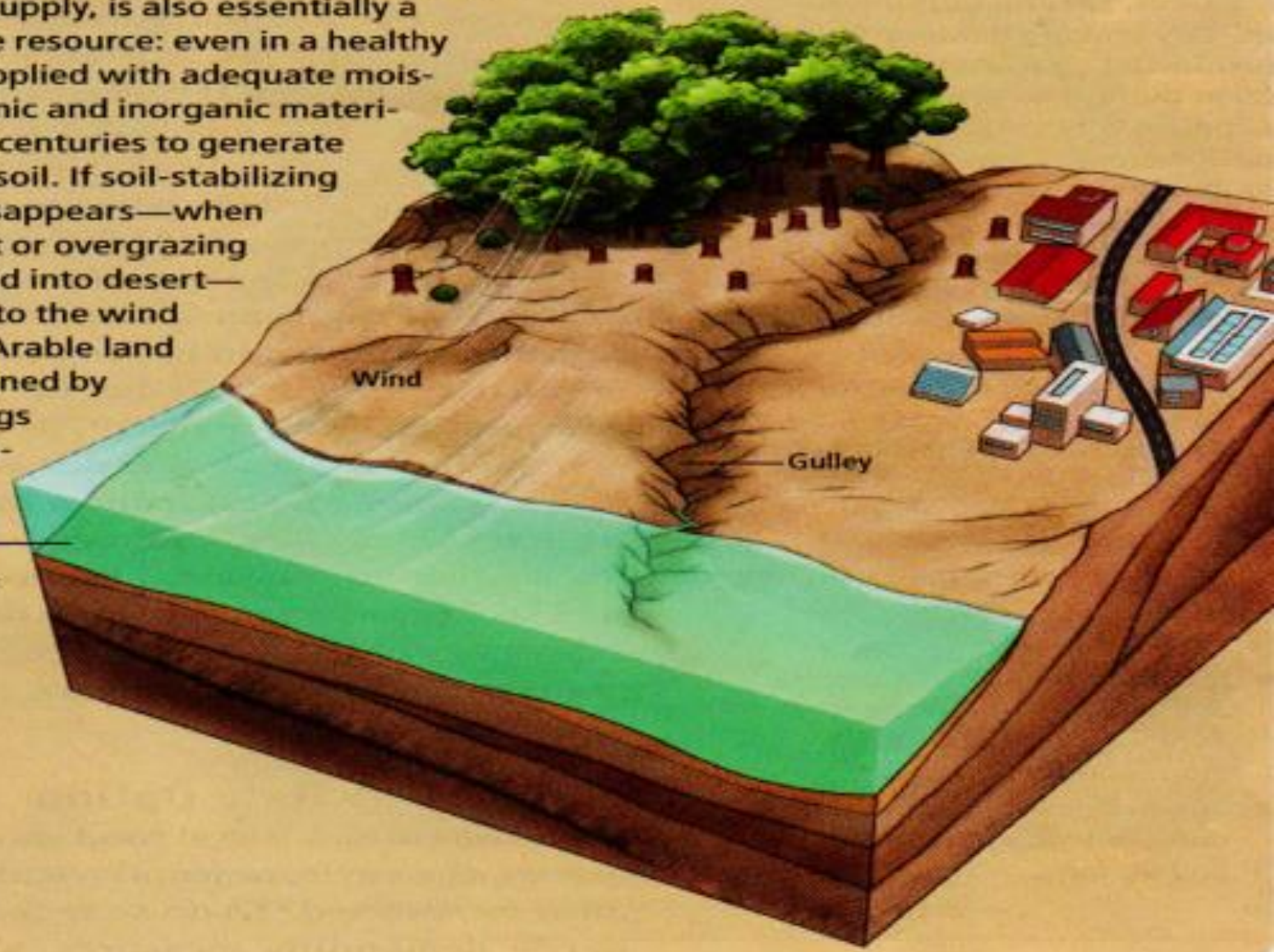
The spreading scarcity of food is emerging as the central cause of state failure. Food shortages arise out of a tangled web of causes, effects and feedbacks whose interactio often intensify the effects of any one factor acting alone. Some of the most common factors are depicted in the diagram. According to the author, today's food shortages are not the result of one-time, weather-driven crop failures but rather of four critical long-term trends (*below*): rapid population growth, loss of topsoil, spreading water shortage and rising temperatures.



[ERODING SOILS]

Arable Land Is Disappearing

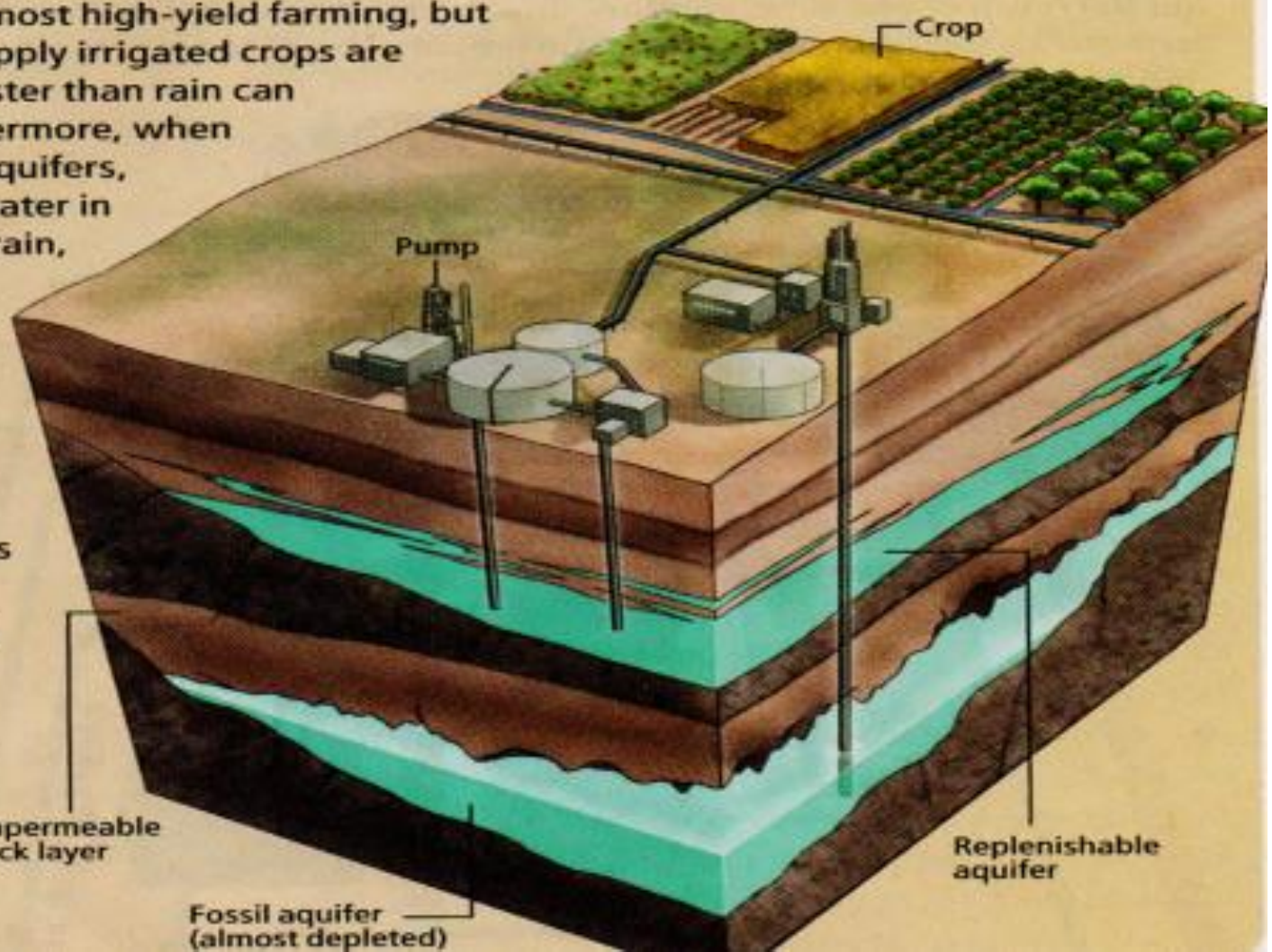
Topsoil, another vital factor in maintaining the world's food supply, is also essentially a nonrenewable resource: even in a healthy ecosystem supplied with adequate moisture and organic and inorganic material, it can take centuries to generate an inch of topsoil. If soil-stabilizing vegetation disappears—when forests are cut or overgrazing turns grassland into desert—topsoil is lost to the wind and the rain. Arable land is also threatened by roads, buildings and other non-farm usage.



[FALLING WATER TABLES]

Irrigation Can Lead to Severe Water Shortages

The greatest drain on supplies of freshwater is irrigation, which accounts for 70 percent of freshwater usage. Irrigation is essential to most high-yield farming, but many aquifers that supply irrigated crops are being drawn down faster than rain can recharge them. Furthermore, when farmers tap "fossil" aquifers, which store ancient water in rock impermeable to rain, they are mining a nonrenewable resource. Pumping from ever deeper wells is problematic in another way as well: it takes a lot of energy. In some states of India, half of the available electricity is used to pump water.



[RISING TEMPERATURES]

Hotter Climate Will Reduce Yield

Agriculture as it exists today has been shaped by a climate system that has changed little in the 11,000-year history of farming. Because most crops were developed for maximum production under these stable conditions, the higher temperatures that are expected from global warming will reduce crop yield, measured in bushels per acre harvested. Crop ecologists reckon that for every rise of one degree Celsius (1.8 degrees Fahrenheit) above the norm, wheat, rice and corn yields fall by 10 percent.

Thailand

-Population in 2007,63.525 millions

-Agricultural GDP about 10%

-About 40% (24.863) millions of population work in Agricultural related jobs

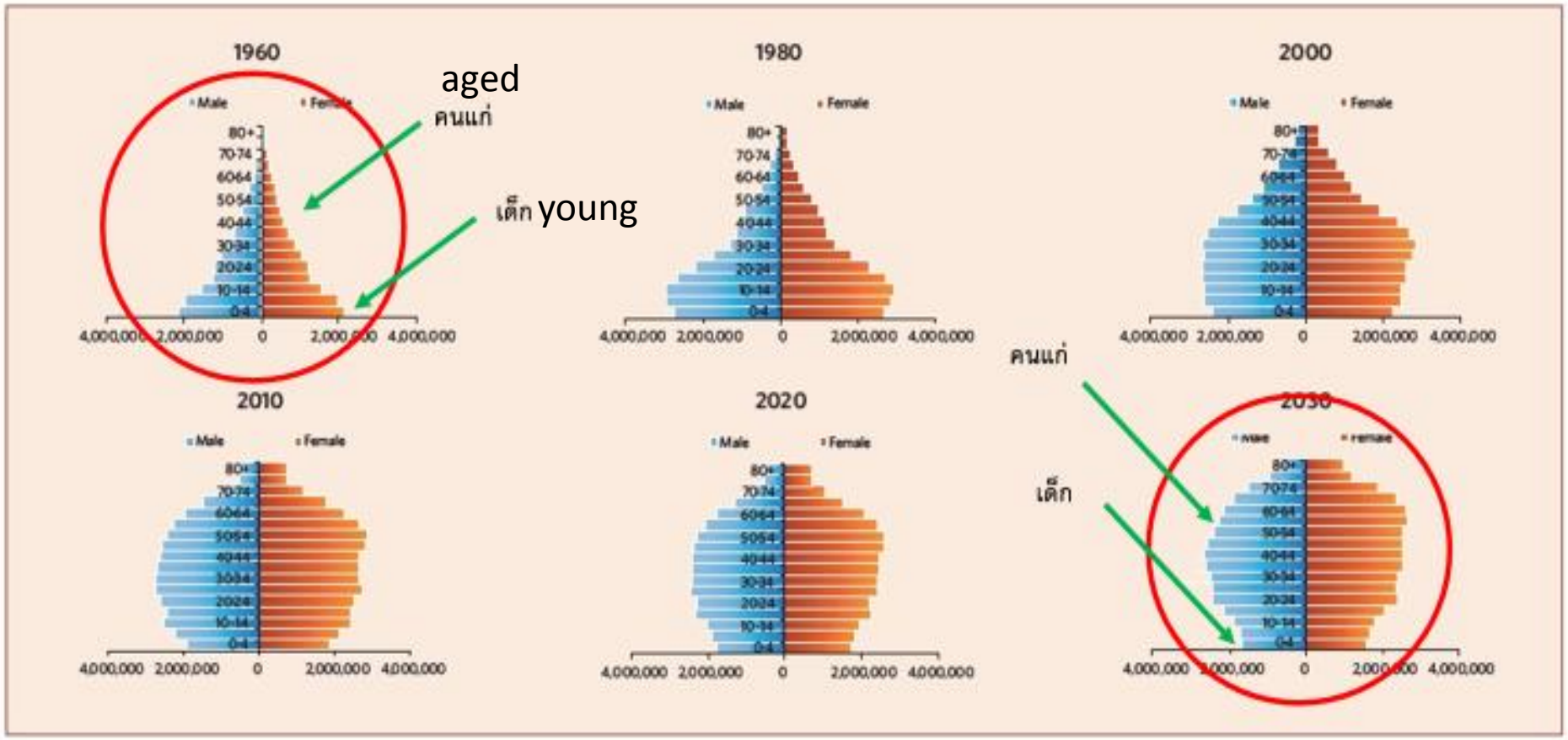
-Most of the farmers own less than 50 rai (8hectares)/household

-About 30% of small farm holders are in NE Thailand

-About 17 % of arable land in NE is irrigated

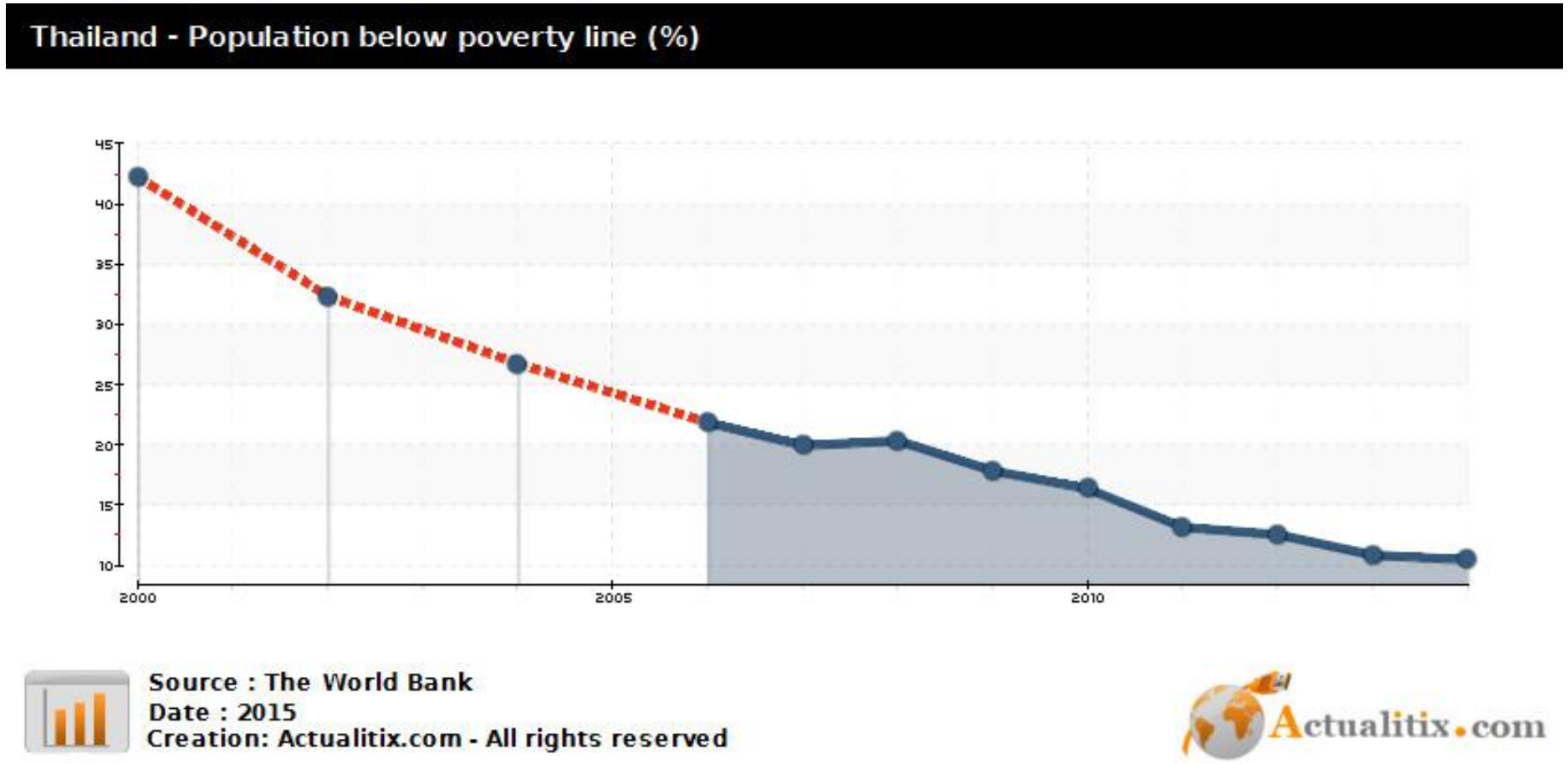
Thai Demography

โครงสร้างประชนกรไทย2503-2573



Source: Population in 1960-2000 from Thailand Population Census. Population in 2010, 2020, and 2030 from World Population Prospects: The 2008 Revision. United Population Division, 2009 (low variant)

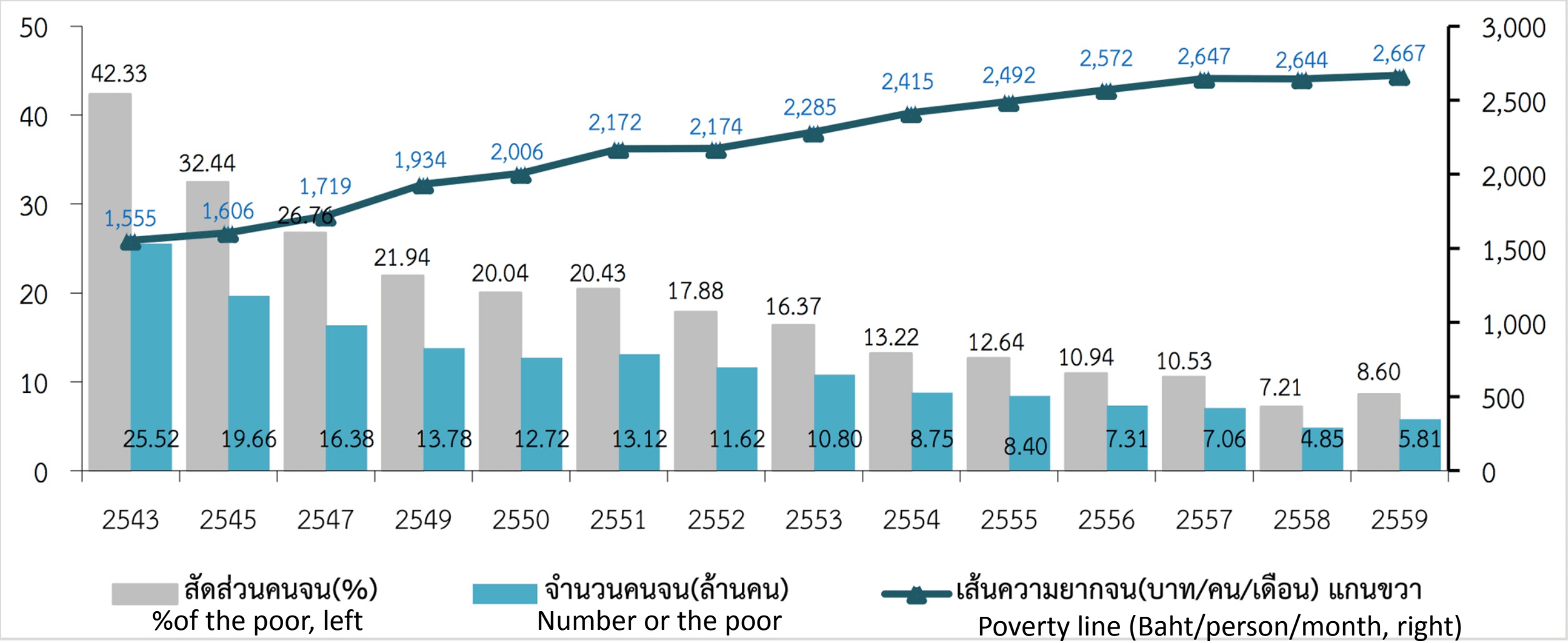
NE population is about 1/3 of the country



Poverty is more pronounce in NE but far better than 40 years ago

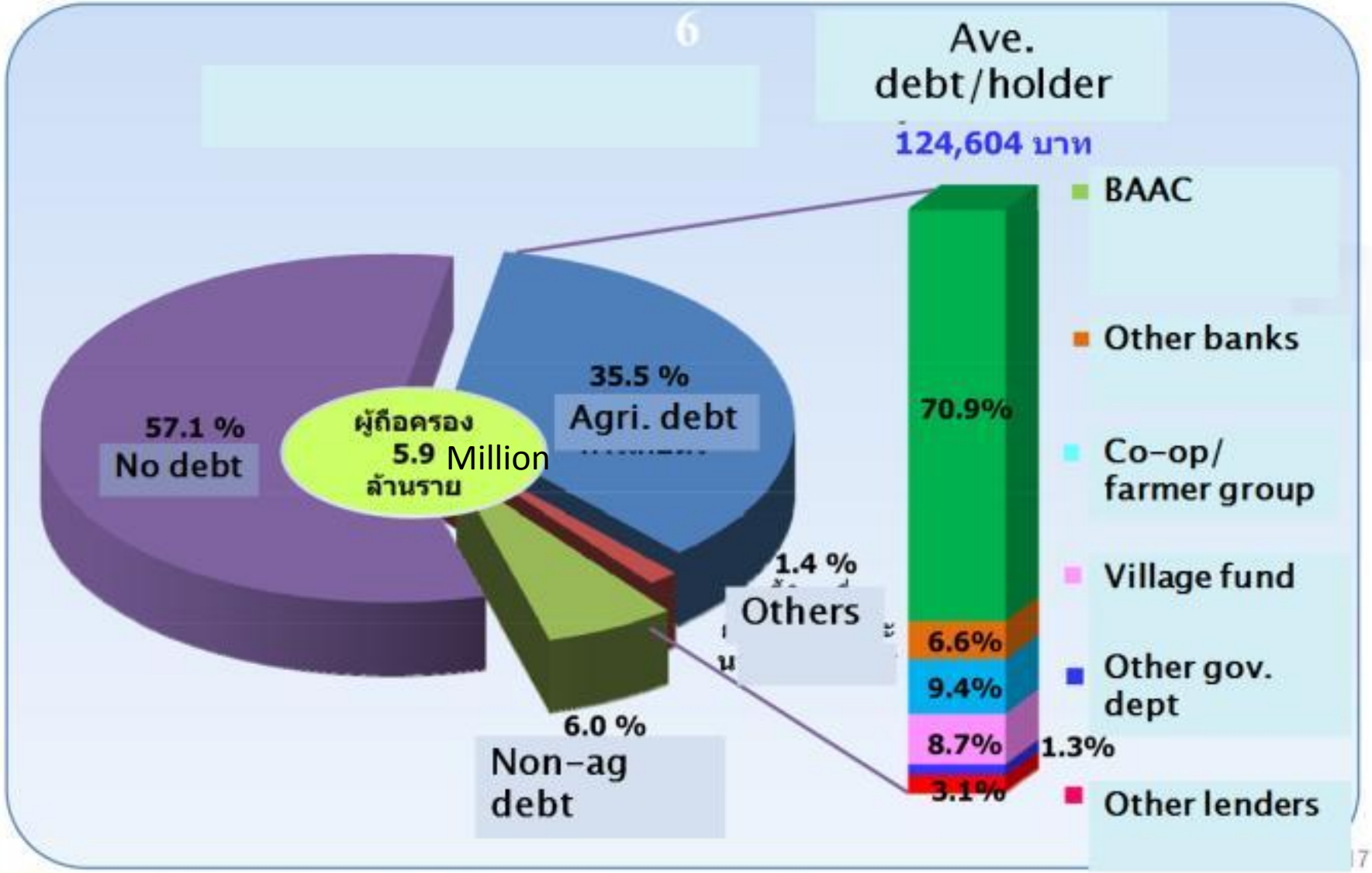
แผนภาพที่ 2 : เส้นความยากจน สัดส่วนคนจน และจำนวนคนจน ตั้งแต่ ปี 2531-2559

Poverty line

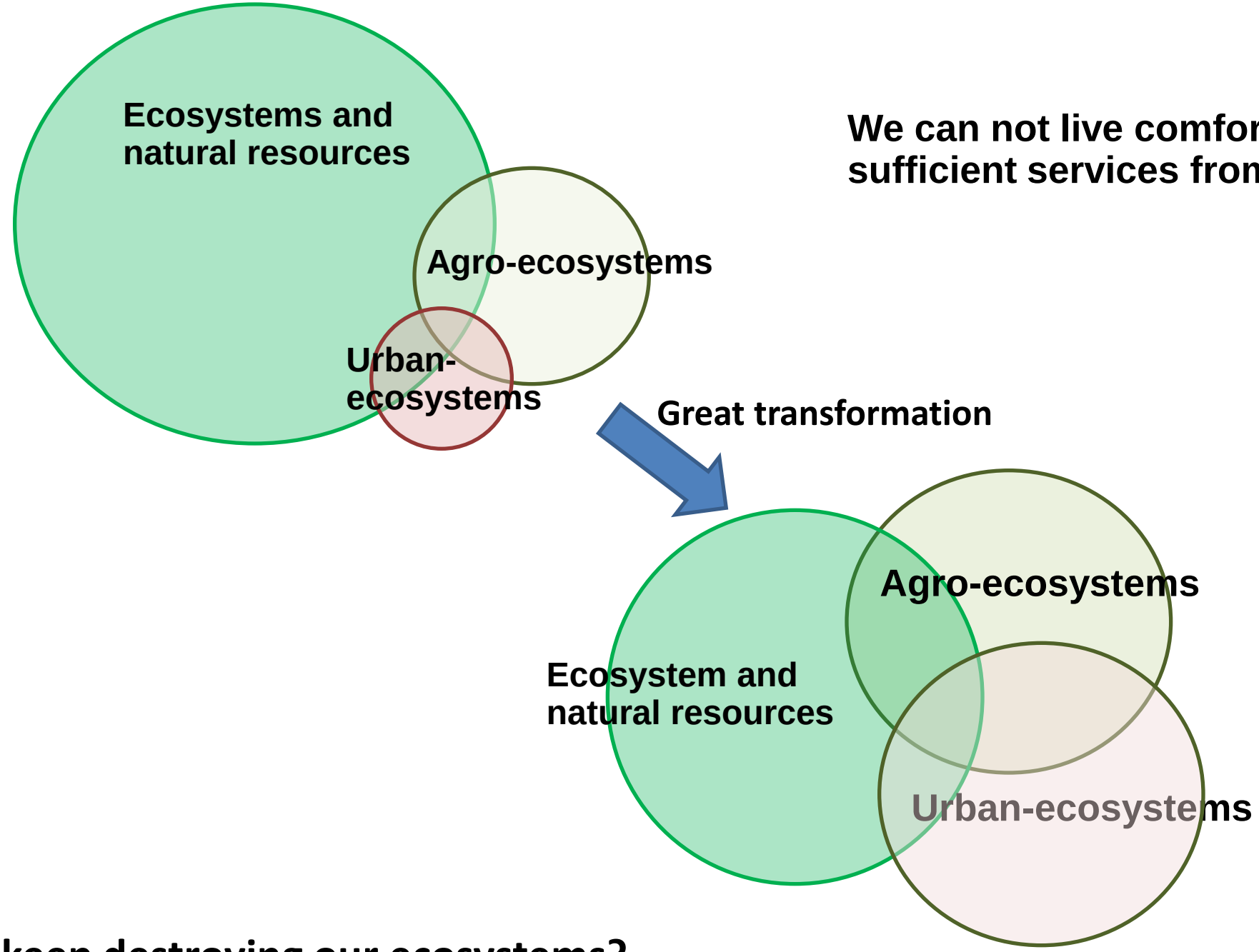


ที่มา : ข้อมูลจากการสำรวจภาวะเศรษฐกิจและสังคมของครัวเรือน สำนักงานสถิติแห่งชาติ ประมวลผลโดยสำนักพัฒนาฐานข้อมูลและตัวชี้วัดภาวะสังคม สศช.

Farmer household debt year 2013



We can not live comfortably without sufficient services from ecosystems



Why we keep destroying our ecosystems?

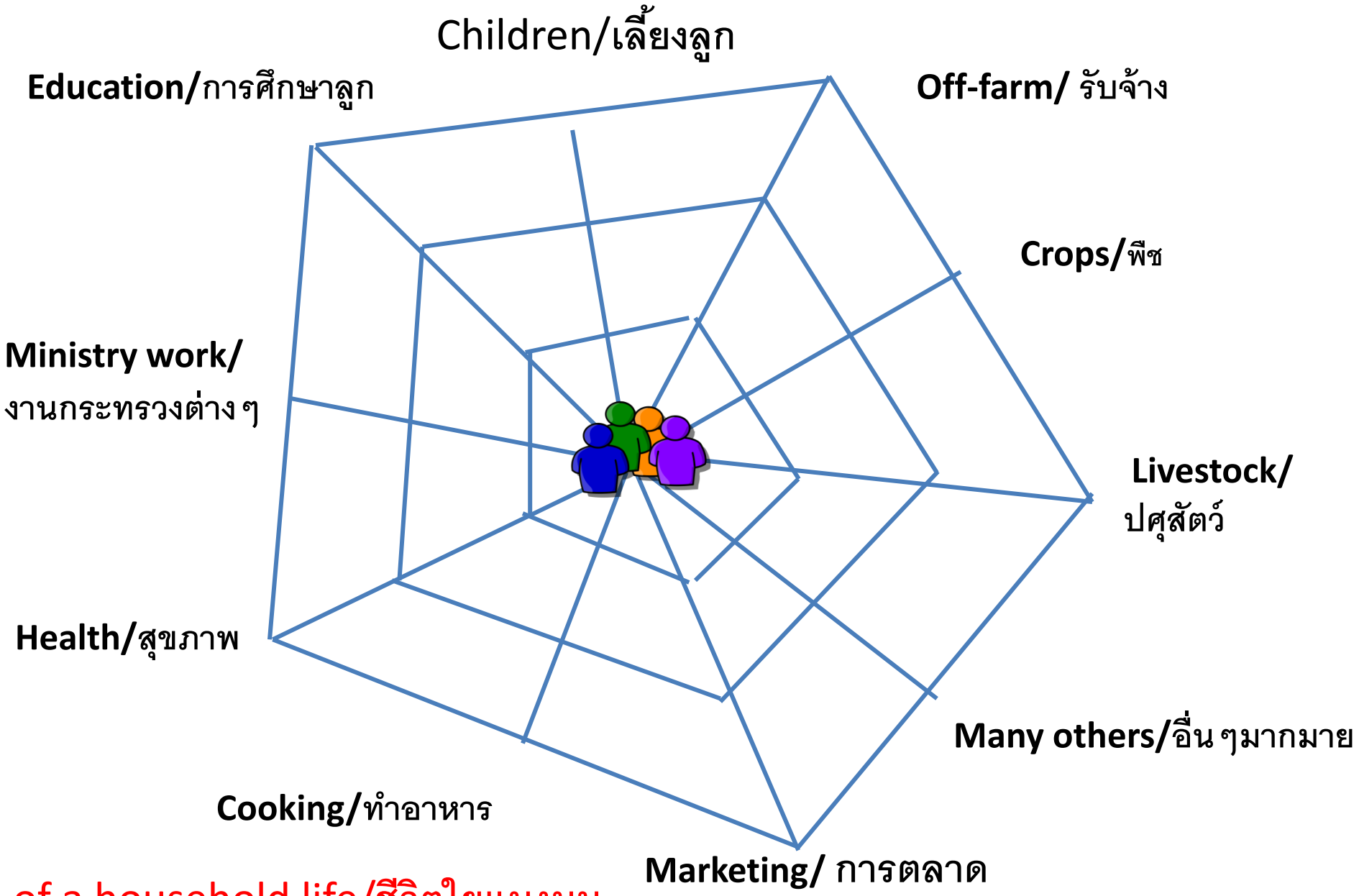
Types of small farmer holders

Subsistent, very few
Semi-commercial (majority)
Fully commercial
Contract farming (increasing)

-Subsistent farmers in Thailand and NE Thailand are almost non –existent

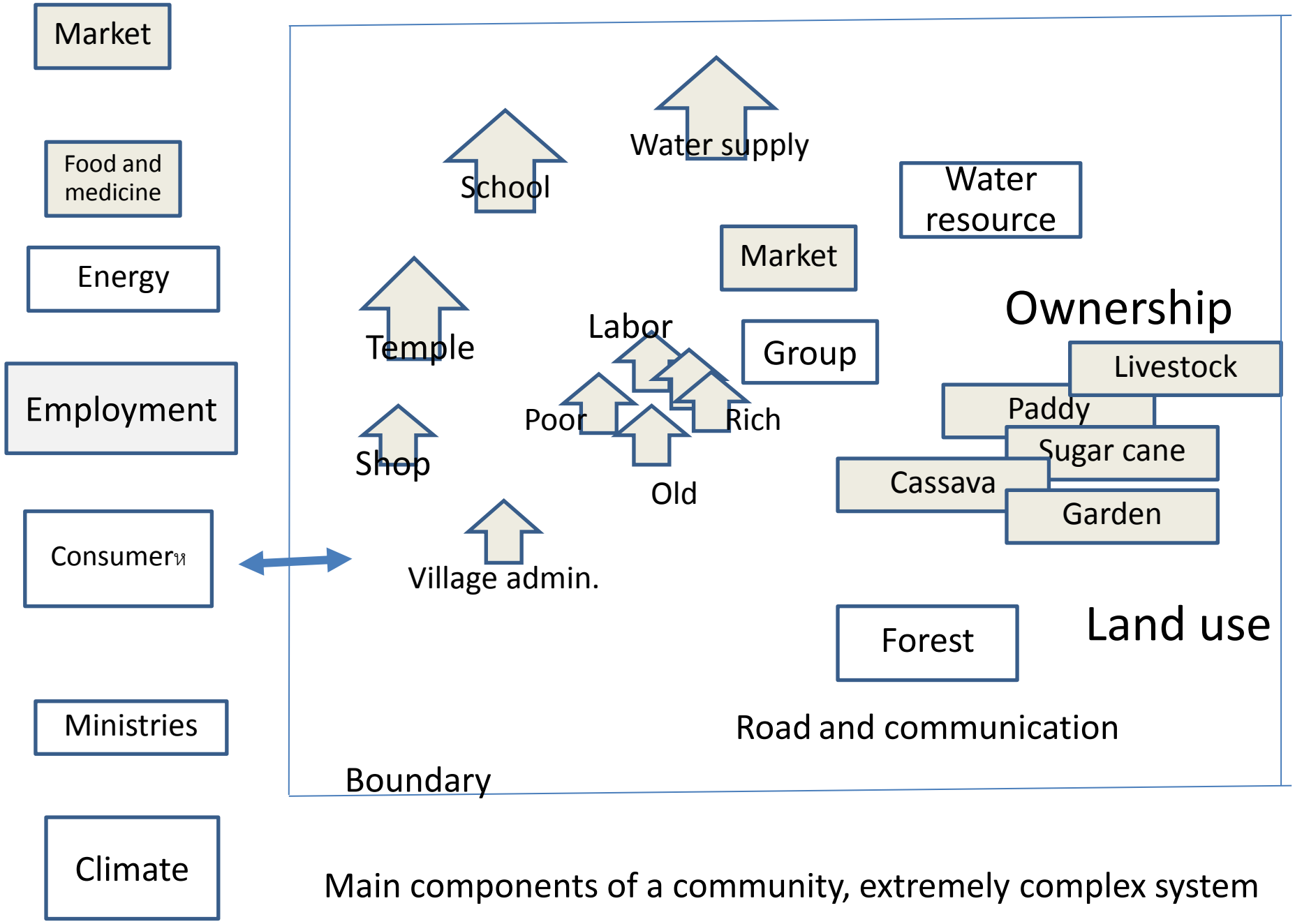
-Majority are semi-commercial but gradually moving toward fully commercial

-Most of organic farmers (fully or partially) are of semi-commercial type. Organic farmings are not wide spread yet, in Thailand and NE Thailand.



Spider web of a household life/ชีวิตใยแมงมุม

Each household is different/แต่ละครัวเรือนไม่เหมือนกัน



Main components of a community, extremely complex system

Community is a very complex system because of heterogeneity of households and resources

Young people migrate to find jobs away from their community

Migration of labor to work in city is not easy

Older female vs male remain in community

Children and aged woman(also man) remain in community is also not an easy life

Some notes

-Agricultural activities in NE depend much on climate, irrigation cover about 17% of the arable land.

-Both diversified and integrated farming exist in mixed form.

-Land use is mainly according to topography in combination with climate (rain fall).

-One household usually occupies different land topography, key to sustainability.

-Livestock production, although greatly declined, is mainly in this region and mostly extensive system. Intensive system slowly expands. Cricket raising by small holders is well established.

-Contract poultry farming is dynamic in terms of farm owner and confined to low proportion.

-Field duck raising is a recent activity

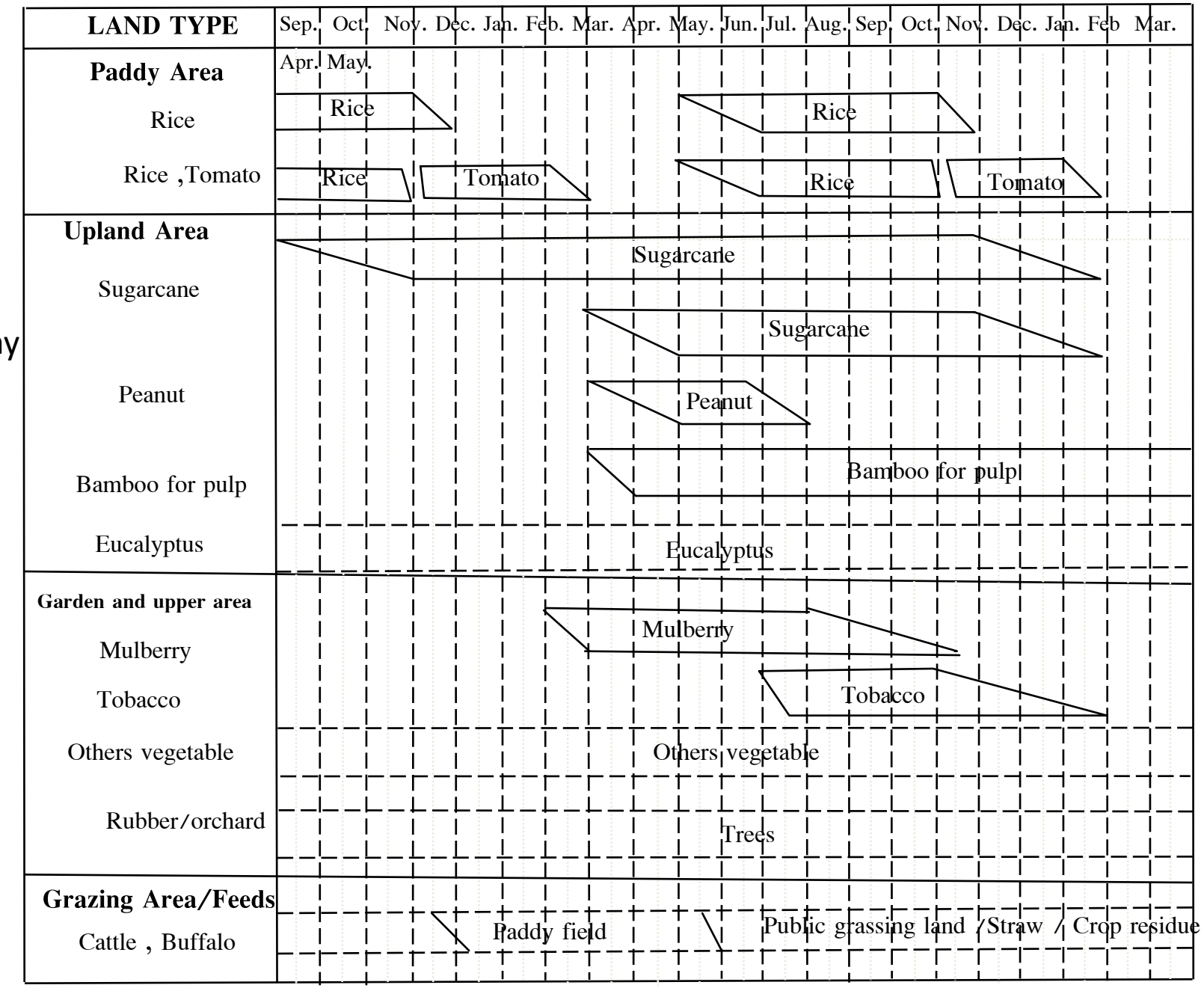
-Dairy farming had been introduced few decades ago but increase rate is now.

-Orchards for local consumption and export are increasing.

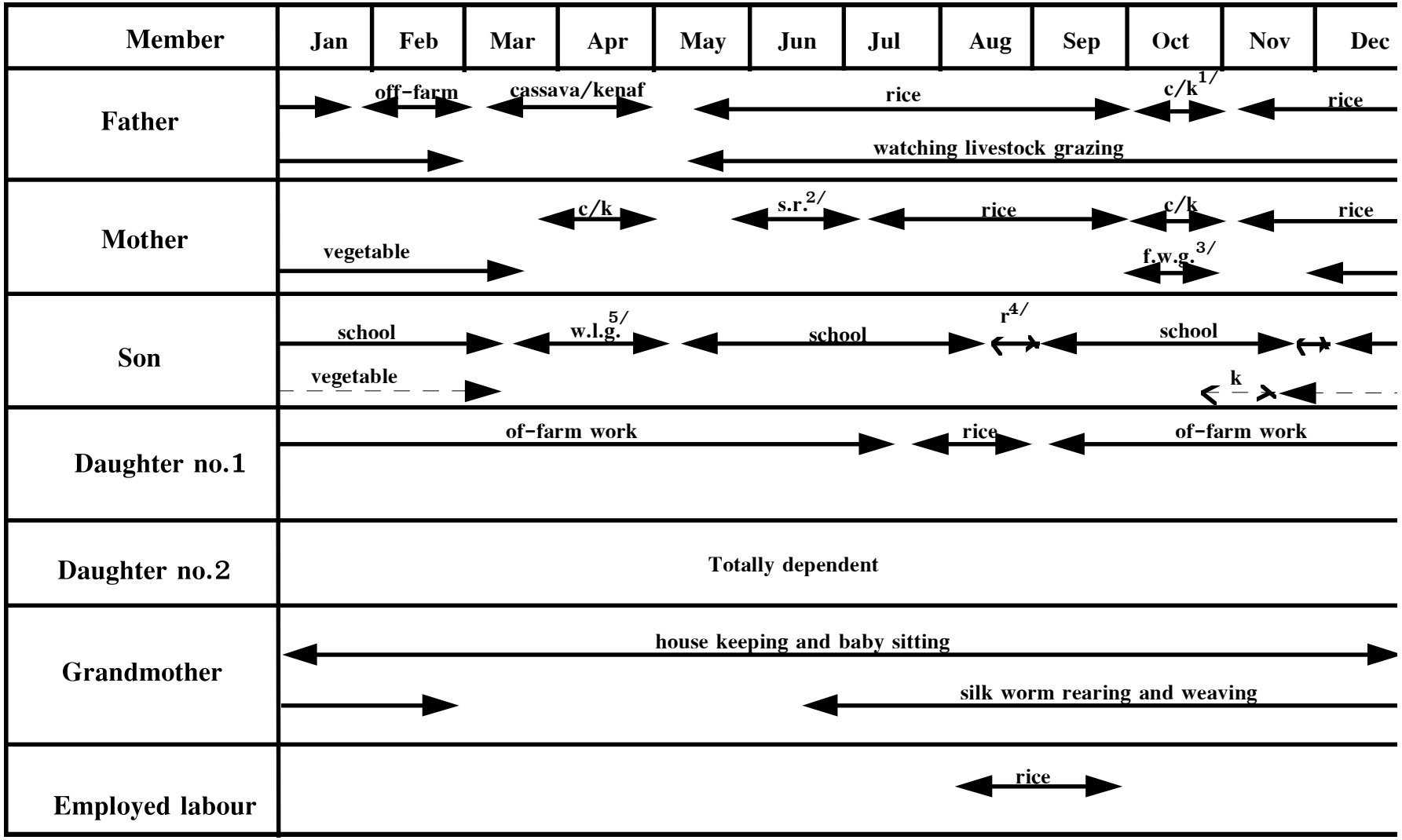
-Harmful chemical are widely used by the farmers

Example of general seasonal activities of small farmer holders in NE

Land use according to undulating topography



Seasonal Labour Schedule of Members in a Typical Farm Household of Northeast Thailand



1/ c = cassava, k = kenaf

2/ s.r. = silk worm rearing

3/ f.w.g. = firewood gathering

4/ r = rice

5/ watching livestock grazing

= full time

= part time

Source : Limpinuntana, unpublished

Transformation

The farmer used 4 wheel tractor for plowing and harrowing.

Managing water for rice cultivation now mechanized

Traditional rice transplanting system by shared labor

New technique

Transplantor

Mechanized rice transplanting limited to certain area, irrigation

Traditional shared labor with hand harvesting rice has become rare

Harvester has become a common scene

Hand threshing
is rare, find labor bank
in some community

Immediate sell of harvested rice is compelling due to debt and other activity investment

Demand for rice straw increases

However conventional farming system(rice, cassava, sugar cane) is still a major practice

Rubber plantation still viable even at low rubber price

Pomelo orchard for domestic market and export

Along with pomelo high value mushroom is equally important

Banana plantation for commercial purpose

Corn growing is mostly under contract or semi-contract farming

Sugar cane growing is in some form of contract farming, small holders are declining

Sugar cane growing is in some form of contract farming, small holders declining

Coffee plantation is very recent cropping

Bitter melon plantation

Rather big holder farming for commercial purpose

Mango orchard

Export quality

High value crop, like melon,
is becoming more popular

Only few can invest on this type of farm

Big farmer with new variety and more sophisticated technology

Chilli for domestic consumption and export

Silk warm and silk production remain in certain locations for commercial purpose

Cricket raising by small holders for supplementary income

Simple and advanced mushroom cultivation production are practiced by some farmers

Household convenient food and goods storage

Frog raising by the pond

Multi-layer , multi-purpose

Large scale caged fishery in Mekong river

Cage fish raising **small scale**

Going for fishing

Tamarind primary processing

Garland sale at traffic intersection

Resources from paddy and near by area are important household food as well as for market

Non-timber forest products are still important for many communities

Native vegetables

For marketing instead of home consumption

Even though charcoal use declined but demand remain vital for specific uses

Integrated farming on rice base is increasing

Trees with variety of food crops, complex integration?

Organic vegetable farming

New variety of vegetable in organic farming

Wood venegar for pest control in organic farming

Hazardous chemical agents in agriculture

Traditional buffalo raising is rare

New breed new management of beef cattle

Integration medium scale, Nongkai

Chicken and fish

Multi-layer , multi-purpose

According to plan

Some land bio-diversity as food sources from forest. Is this food security?

Community enterprise products from native trees

Different milled rice
 from local community
enterprise

Big community enterprise

Roadside stall, direct market is expanding

Farmer’s community grocery shop owner

Community gas station

Learning to know self and awareness

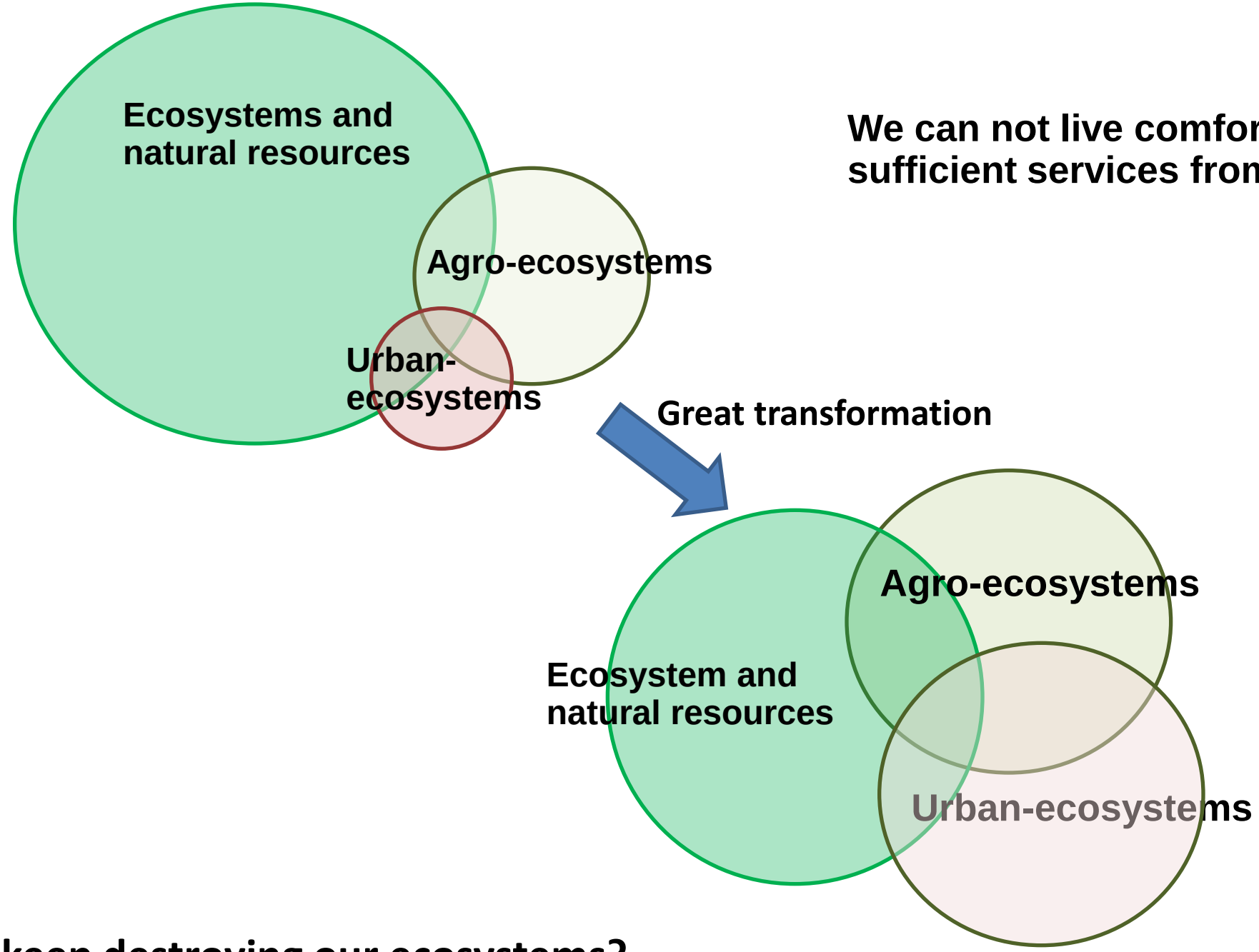
Learning how to
do simple research

Farmers are exchanging their experiences in the groups

Will younger people remain in community?

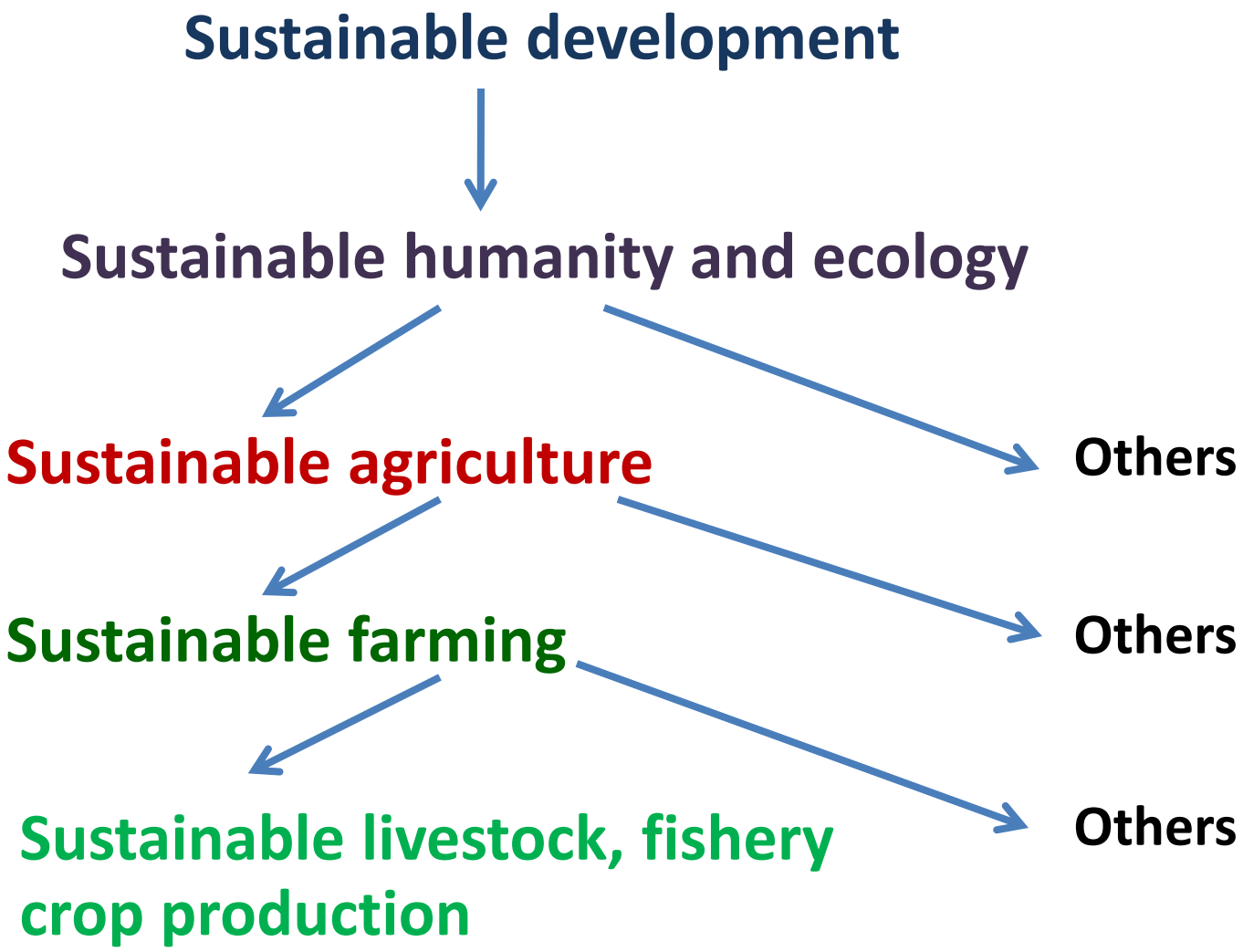
Community holding force

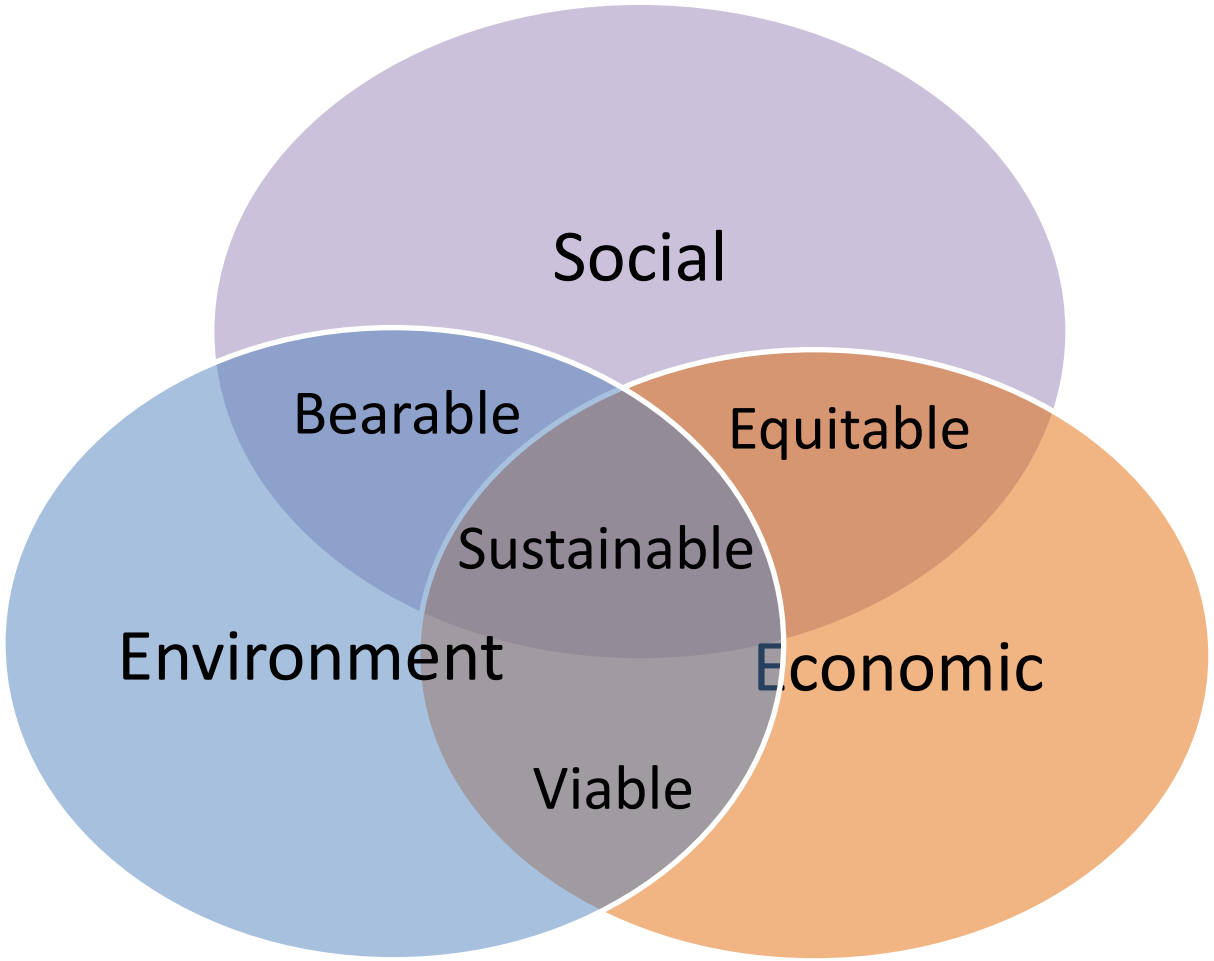
We can not live comfortably without sufficient services from ecosystems



Why we keep destroying our ecosystems?

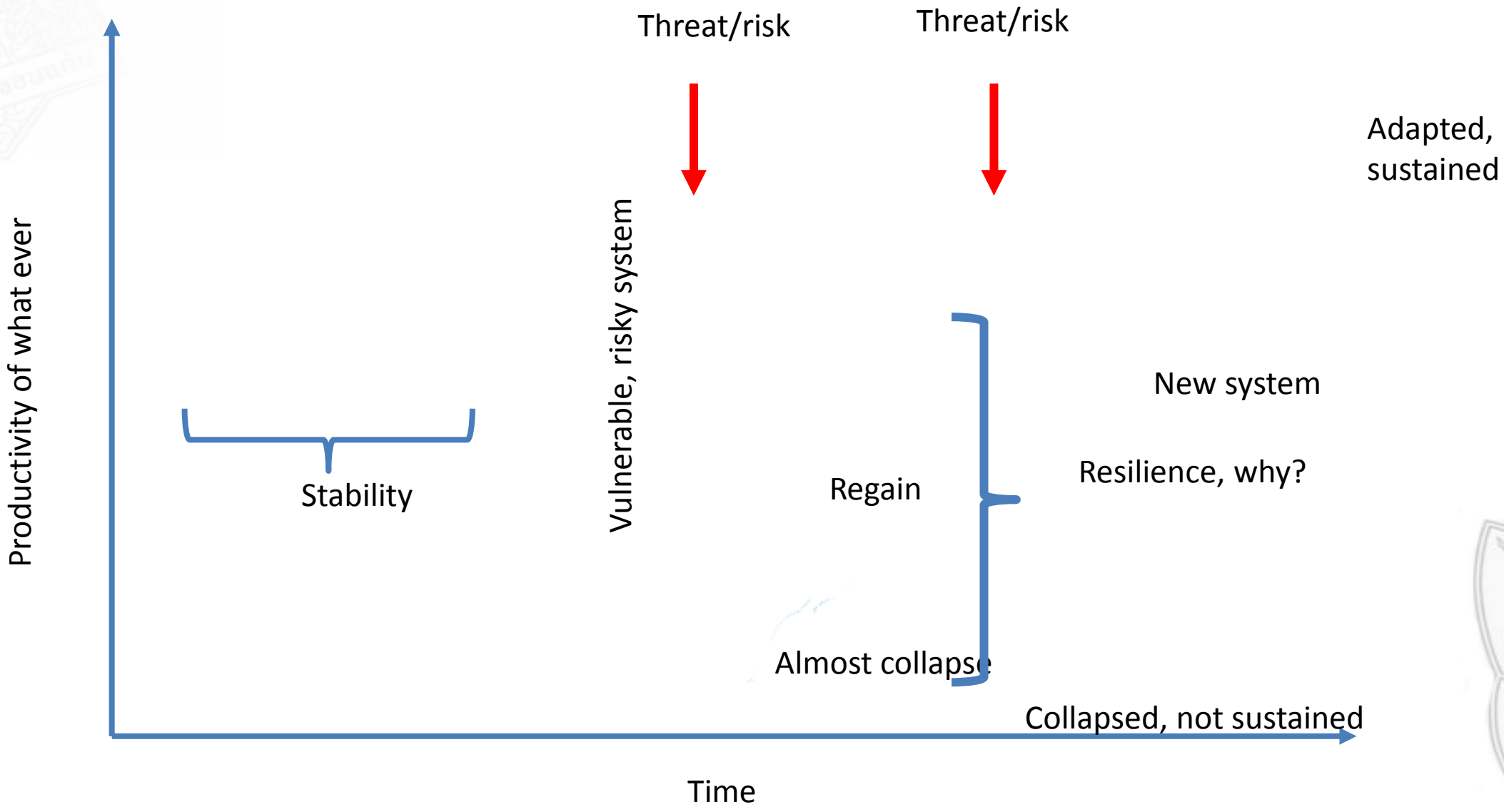
Hierarchy of sustainability

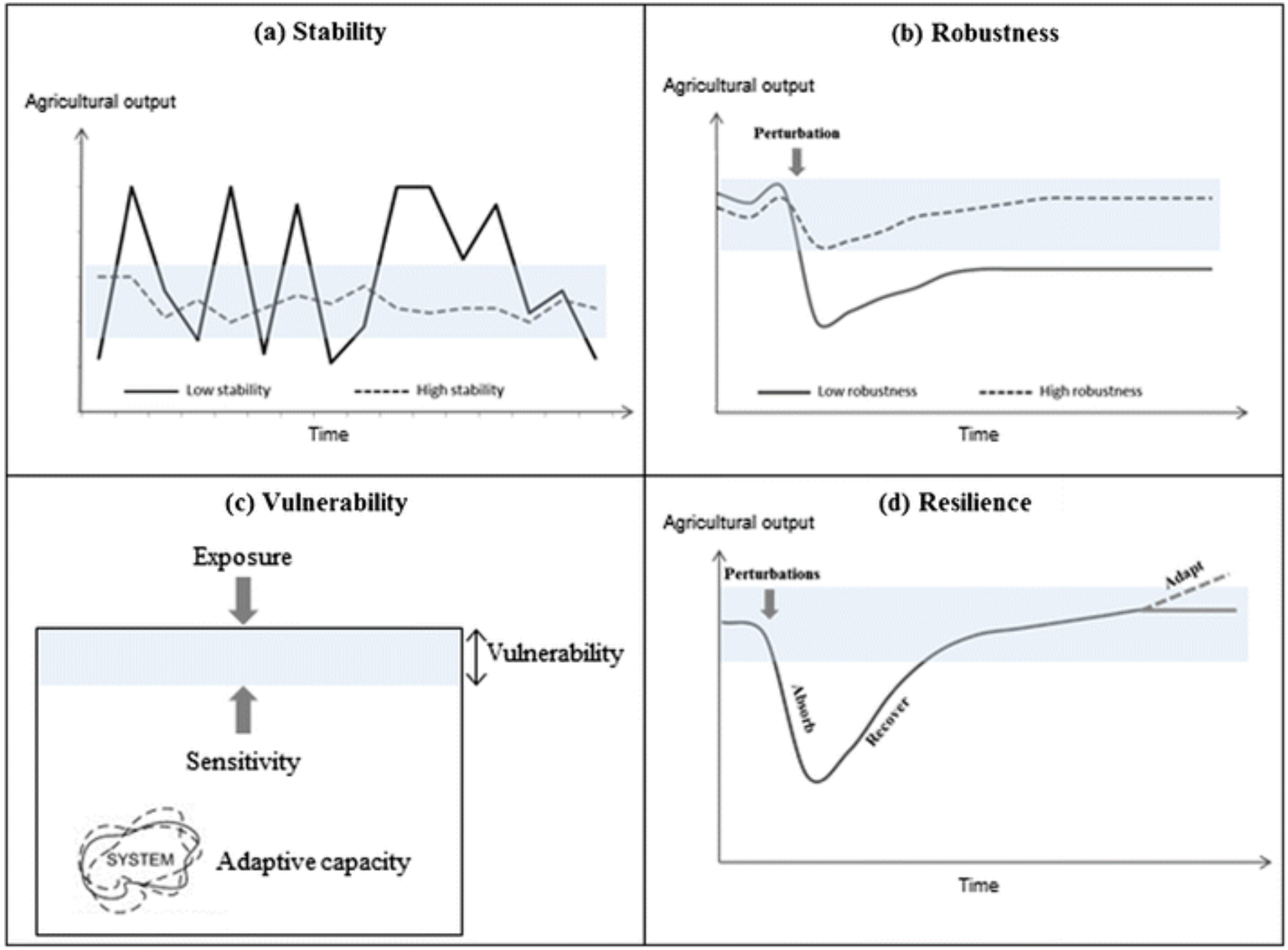


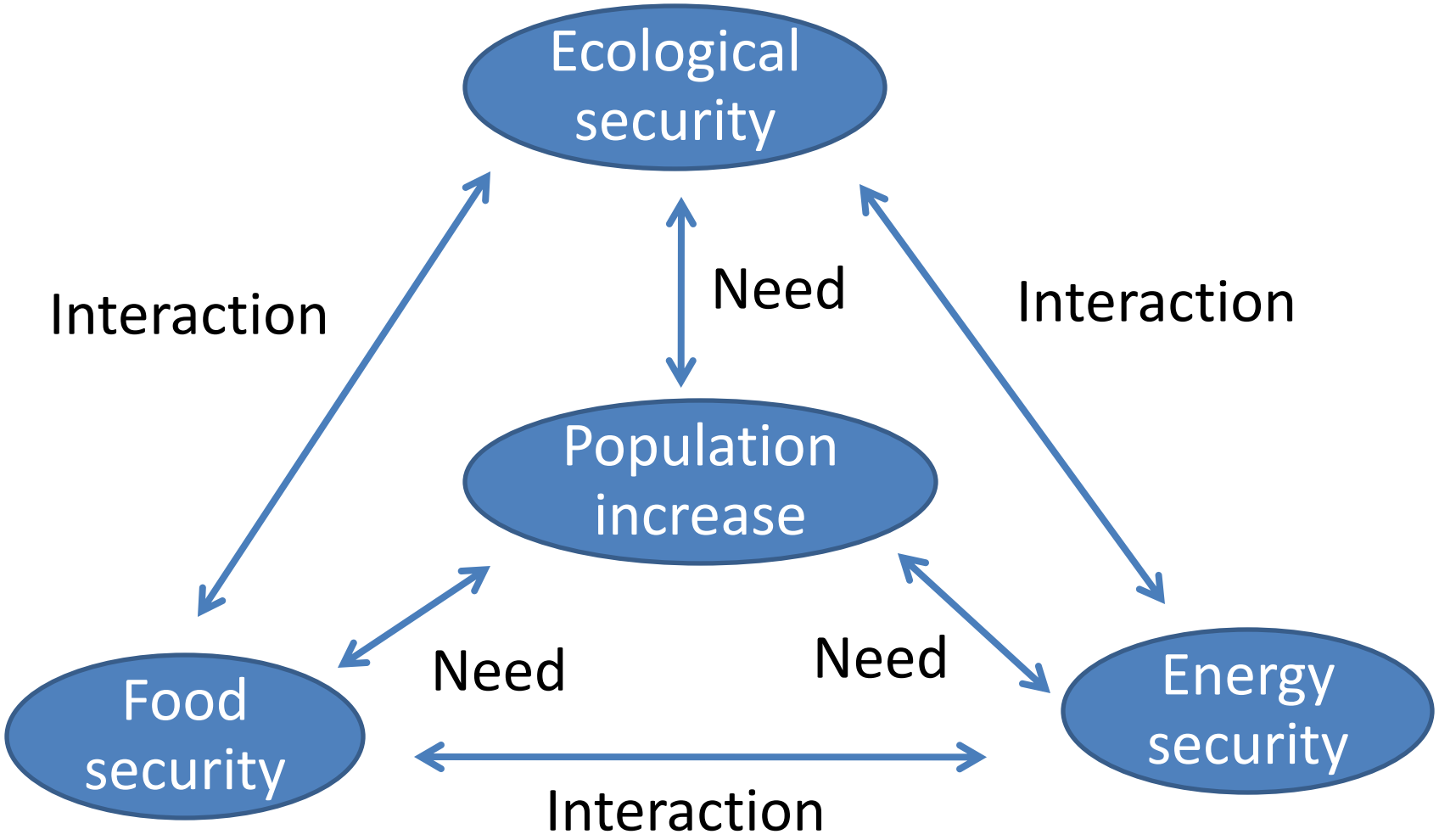


Sustainable development with three preoccupations overlapse

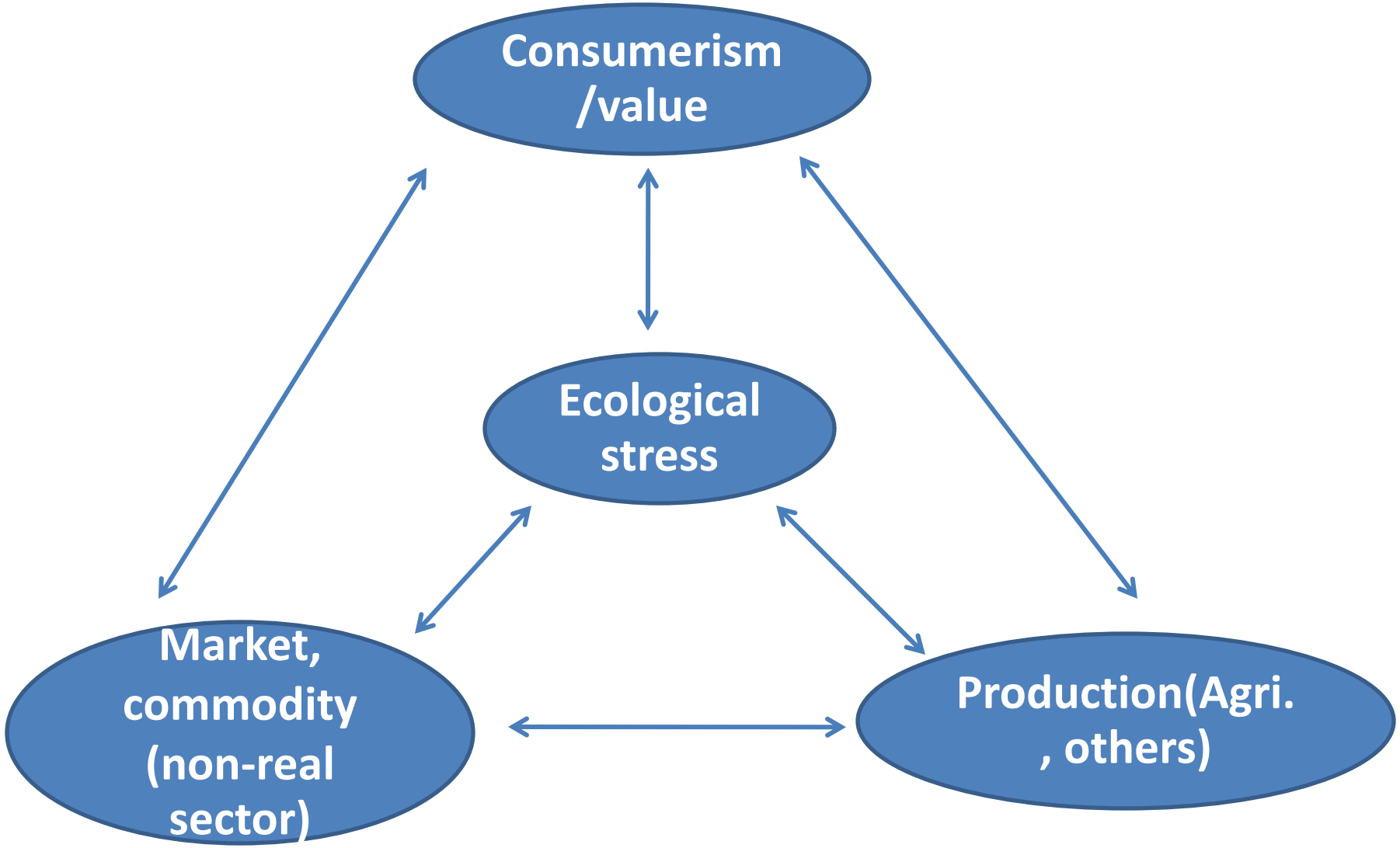
Diagram: sustainability , resilience and stability on time scale.



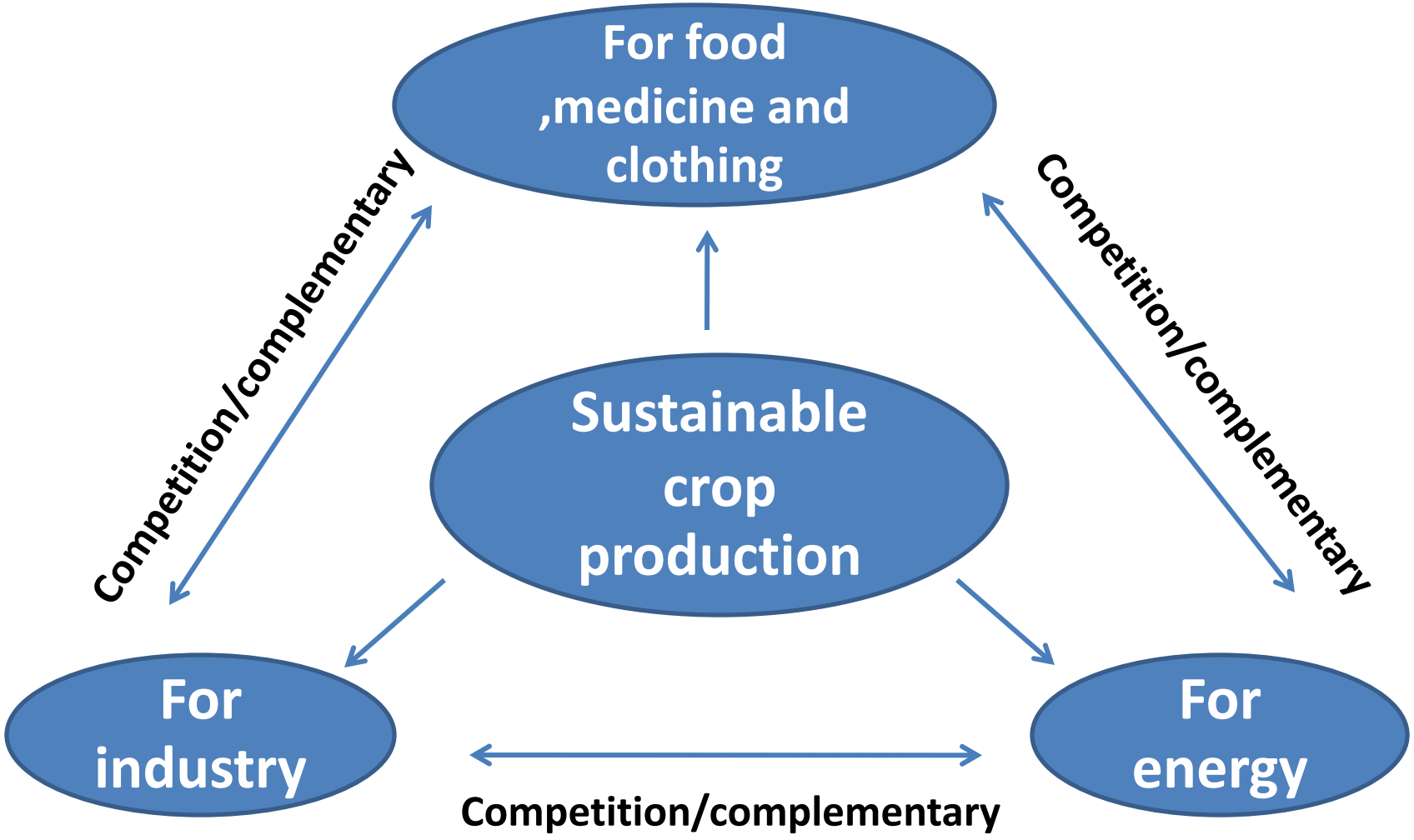

(a) Stability
Agricultural output
Low stability
High stability
Time
(b) Robustness
Agricultural output
Perturbation
Low robustness
High robustness
Time
(c) Vulnerability
Exposure
Vulnerability
Sensitivity
SYSTEM
Adaptive capacity
(d) Resilience
Agricultural output
Perturbations
Adapt
Absorb
Recover
Time


Ecological security
Interaction
Need
Interaction
Population increase
Food security
Need
Need
Energy security
Interaction

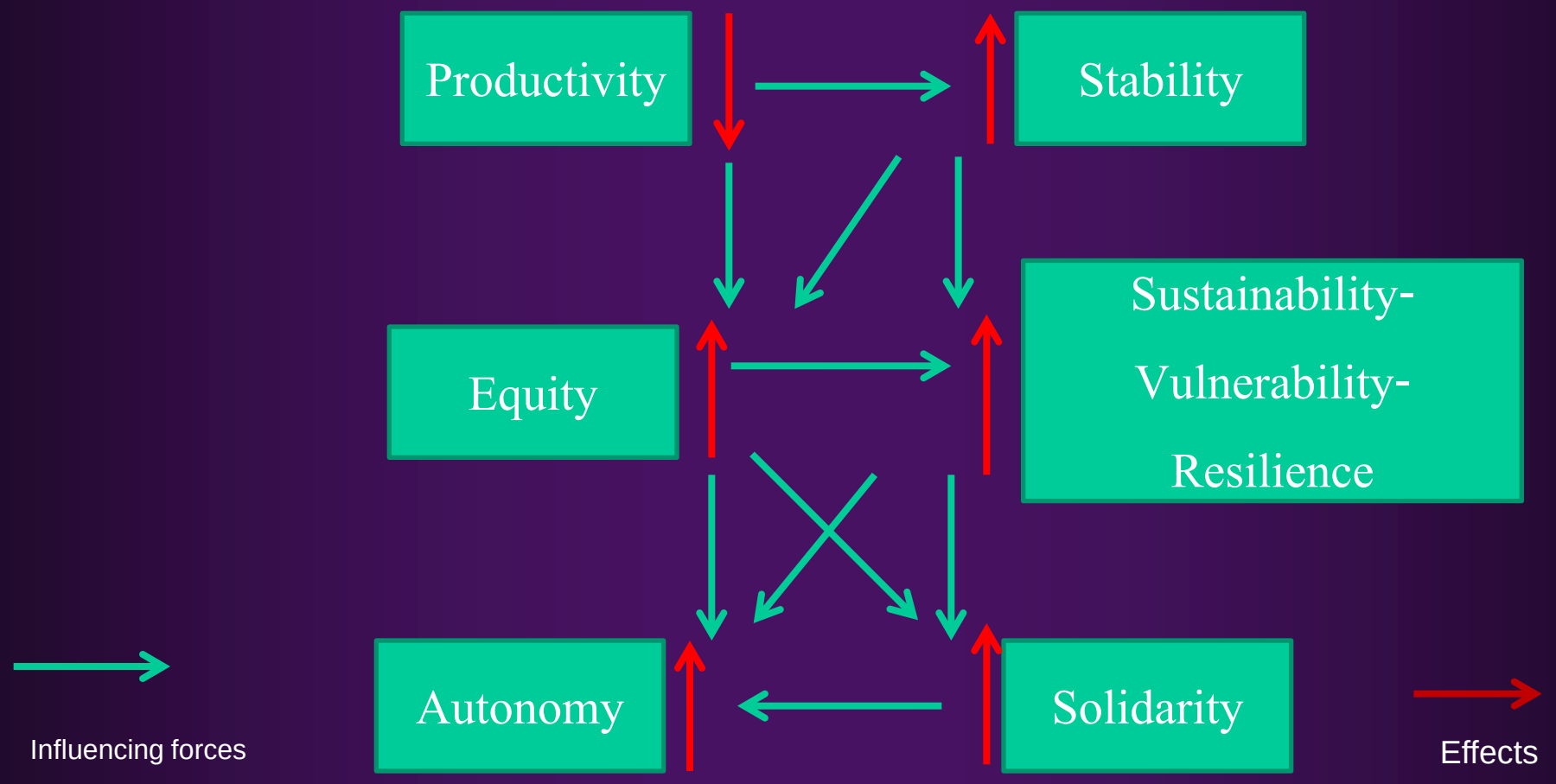
Dilemma



Results from population



Dilemma of sustainable agriculture production



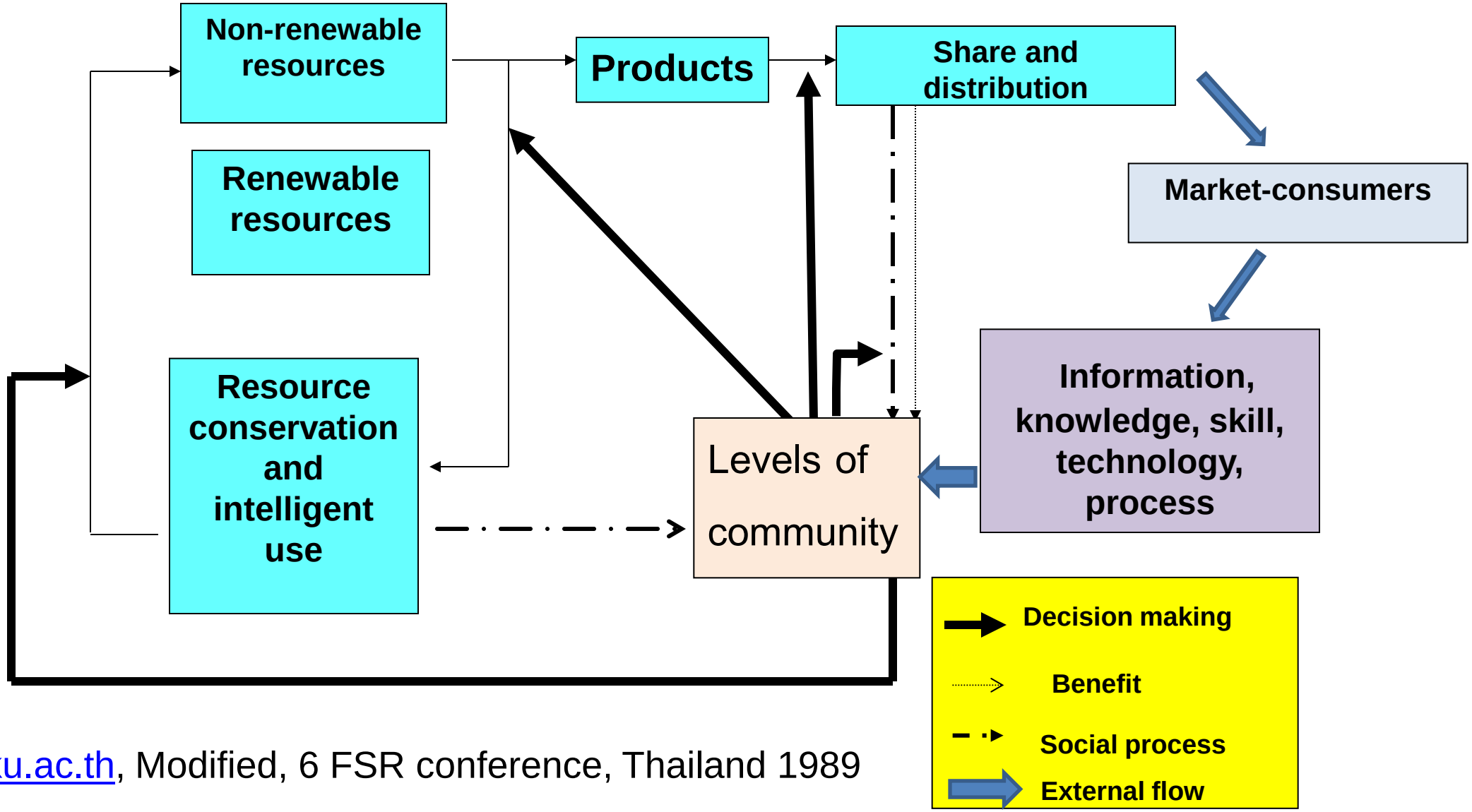
Possible relationships of system properties

Suchint,1989

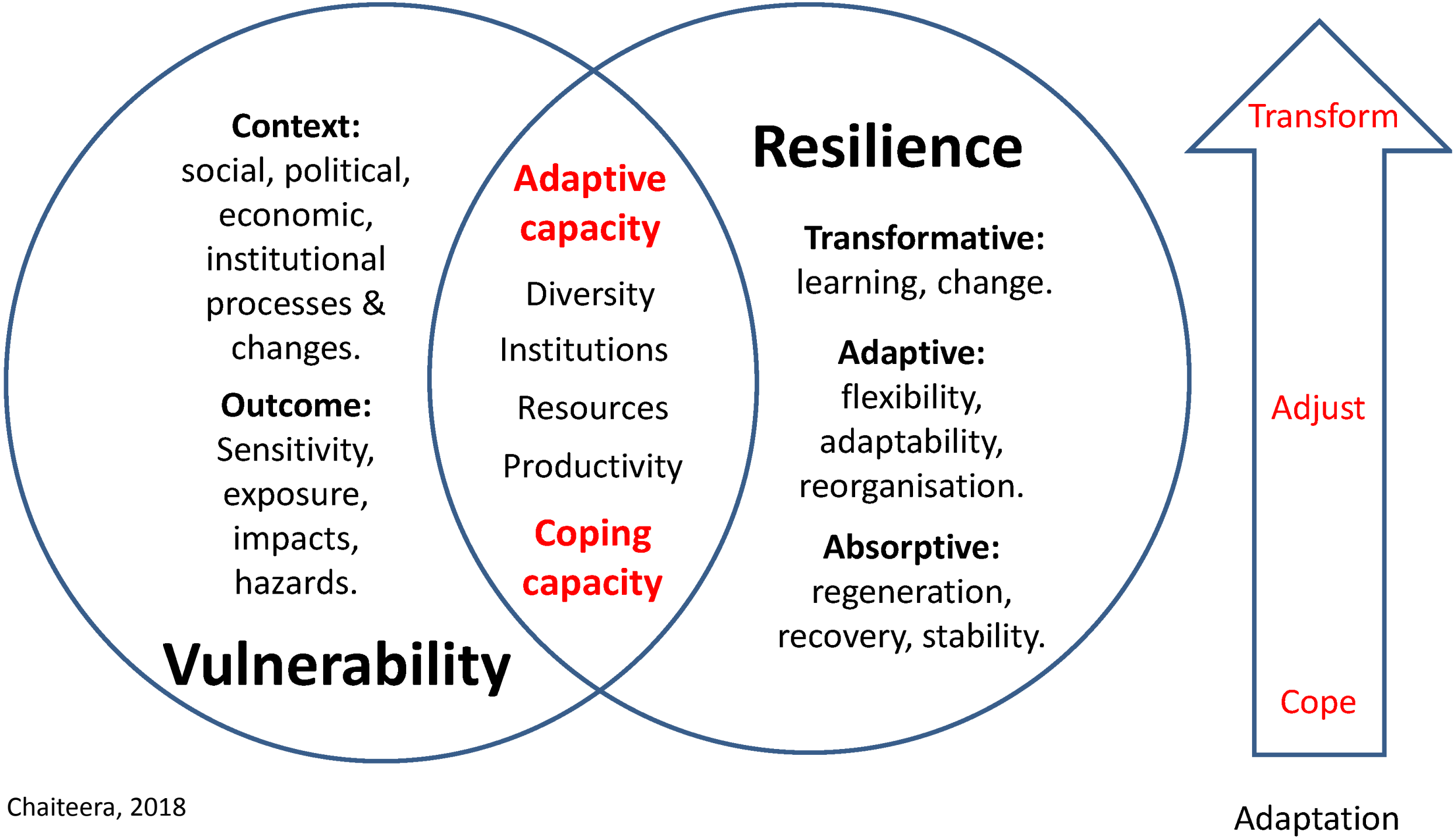
GENERAL SUSTAINABLE DEVELPOMENT

MODEL

Rethink, redesign, reuse, renew, recycle, restore reorganize, empower etc.



suchint@kku.ac.th, Modified, 6 FSR conference, Thailand 1989



Chaiteera, 2018

Sustainable agriculture, Threat and Solution (Challenges)

	Threats	Practices/effects	Solution	practices
Global level				
	Extensive use of non-renewable resources	Use of fossil fuel such as oil, coal, LPG etc.	Renewable energy and research for more efficiency use and production	Increase use of solar, wind, thermal, water ,bio-fuel etc.
	Deforestation	Expansion of agricultural and livestock land and urbanization	Efficient environment friendly land use planning and restoration of degraded forest land	Planning and extension of agroforestry, community forest and household forest
	Drastic and over fishing	Over fishing, often illegally and use of evasive fishing gears	Ecological friendly fishing and conservation	Selective uses of proper fishing gears friendly to ecology and conservation planning and action
	Green-house gas production and climate change	Environment friendly industry, transportation and consumption	Global partnership to reduce GHG	Follow SDGs through projects and activities according to agreement to curb climate change

	Increase of human population, expected to be 9 billion in 2050 increase 60% of food production required	Family planning, increase food production with existing available land environmental concern	Reduce birth rate and build aware-ness for wise consumption, mechanization with more alternative energy	Promote family planning in areas where population keep increasing increase food production with existing available land and use of environment friendly input and technology
	Natural disaster	Damage to agricultural productivity and resources	Forecast and warning, insurance, compensation	Access to forecast information, warning at national and local levels
	Consumerism	Over consumption more production and resource uses	Campaign and increase awareness for balance consumption	Change consumption, recycle, reuse and replenish behavior through knowledge and action
	International trade, free trade	Small farmers suffer from unfair protection, non-tariff barrier	Fair trade first	Small farmers suffering from unfair trade must be taken care in building capacity for international market competition
	Natural resource degradation	Decline in production or increase cost of production and fail state	Sustainable use and planning for natural resources	Agricultural practices with sustainable framing design for productions, conservation, reuse, recycle and replenish

	Threats	Practices/effects	Solution	practices
Local level				
	Deforestation	Economic crops and livestock expansion on the forest area, degradation of land resource	Limit expansion of deforestation, increase agricultural yield, reforestation	Agroforestry, community forest, household forest, more intensive agriculture with environment friendly practices , all level land use planning
	Invasion of declined forest land due to limited agricultural land	Invasive agricultural practices, land settlement, invasion of private and small holder land grab	Policy on land use to limited land grab, reduce conflict of land use, change in agricultural practices	Legality management of illegal land grab, conservative agricultural practices and more intensive land use
	Change of population structure, lack of agricultural labor, young labor migration	Change of family structure, shortage of farmer labor, reduce land size ownership and land owner ship, increase use of farm machinery	Labor saving technology, intensive land use for agriculture, return of younger labor to farming	Promote smart farmers, appropriate technology development for aging farmers, pricing incentive for sustainable agricultural practices
	Food security	Increase in non-food production, mono-cropping, use of harmful chemical in agriculture practices	Balance between food and non-food production and reduce use of harmful chemical agents	Integrated farm planning and farming, save or organic agriculture, pricing incentive and marketing management

	Consumerism	Modern market promote more consumption beyond modern day basic necessary with wide access to social media	Building awareness on the consequence of over consumption	Implement social movement process and knowledge through various type of media and network at all levels
	Disaster	Damaged agricultural production, properties	Accessibility to forecast and warning,	Infrastructures and medias for forecast, installation of effective local warning system
	Out break of pest	Use of pesticides also induce resistant adaptation of the pest, monocropping	Integrated farming (included livestock), cropping system, biological control, carry out in group or larger area	Promote crop rotation, integrate farming, bio-control technology and technique, group organization of farmers
	Mono-cropping, pest, price fluctuation	Extensive commercial cropping invites pest infestation and out break	Integrated farming (included livestock), cropping system, biological control, carry out in group or larger area	Promote crop rotation, integrate farming, bio-control technology and technique, empowering group organization of farmers, learning center
	Weak community, urbanization	Less community livelihood, individualism, weak leadership, less self-reliance	Community empowerment and self-reliance	Restore community life along with urbanization, network, social platform for learning and social interaction among community member, partners

Farm level	Threats	Practices/effects	Solution	Practices
	Pest out break	Extensive commercial cropping invites pest infestation and out break	Farm planning toward more integrated and sustainable system, eco-farming	Implement farm planning, increase use of biological control of pest, use of alternative energy and reforestation at farm level, organic agriculture.
	Farm mechanization	Extensive use of machines that rely on fossil energy	Reduce use of conventional energy	Increase use of alternative energy that can be generated locally
	High cost of agricultural labor, smaller family size	Limited available farm labor, increase of wage for hire labor	Labor use planning to avoid peak labor demand, or replacement of labor	Implement the plan, share labor organization or labor bank, use of light farm machine (VS GO large farm policy)
	High cost of agricultural inputs	Lack of farm labor, rely on external inputs, emphasis on highest productivity, and off-season production, use of farm machines	Reduce unnecessary external input, emphasis on sustainability than highest productivity on mono cropping	Implement farm planning, increase use of biological control of pest, use of alternative energy, share resources, make income and expenditure farm account to decide on cost reduction

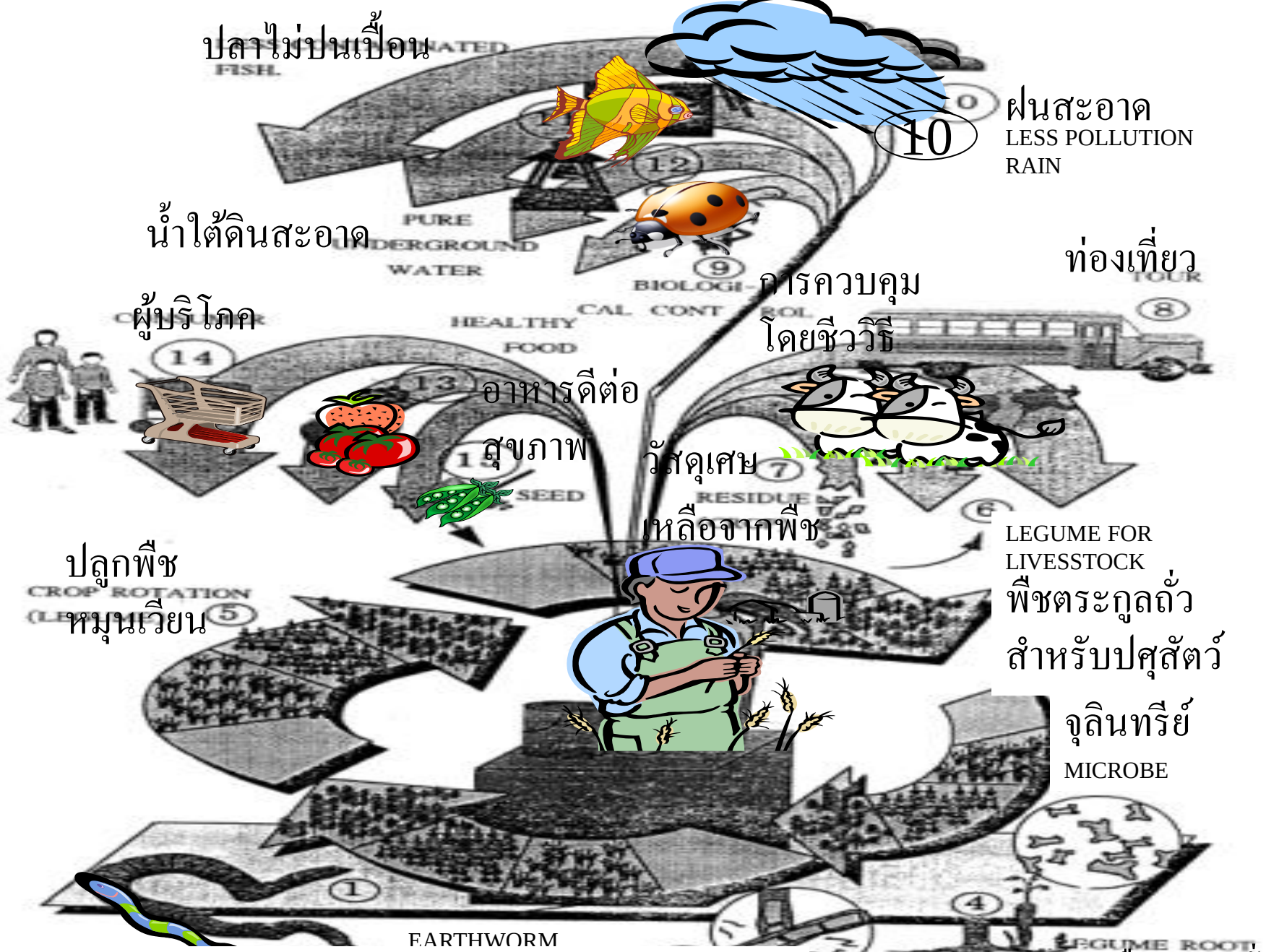
	Natural disaster	Destruction of crops and livestock	Adaptation to climate change	Selective use of suitable variety of crops or breed of livestock and management, improve land scape to reduce impact of disaster, change of farming system
	Land ownership and law	Decline in size of land ownership or access to agricultural land	Land use planning for high value and intensive agriculture	Besides intensive and high value production, other off-farm activities may be included
	Access to market and price fluctuation	Sale through middleman without bargaining power	More farmer direct market and market organization, link with CSR market	Farmer group organization and network, strategic market location, out side organization supports, product standardization, CSR market, on-line market
	Lack of knowledge and wisdom to changes	Less access to knowledge on external changes that impact on farm household and practices	Farmers, knowledge plat- form and network and access to more farming knowledge channels, on-line	Facilitate learning and sharing of knowledge and skills, excursion, external supports, use of available social messures
	Farm environment and resource degradation	Low productivity, more use of harmful external resource	Awareness building and facilitate action	Restoring, recycling, reuse and replenish of natural resources and conservation, Establish social mechanism for sustain agricutural responsibility

Policy level	Threats	Practices/effects	Solution	Practice
	Not effective government policy and inhibiting policy, not working in concert with other concerned agencies Top-down approach mentality	Government officials are insufficient and not fully implement sustainable agricultural policies according to the policy, NGOs have limitation on expanding their work	Use farmers' network and organization to influence policy makers and implementers. Use bottom up approach	Awareness building of the government officials, cooperation with other concern agencies and NGOs, using bottom-up approach and facilitating process. CSR directive toward sustainable agriculture support

How can we scale-up these practices?

How to resist top-down approach, unsustainable implementation, by the GO

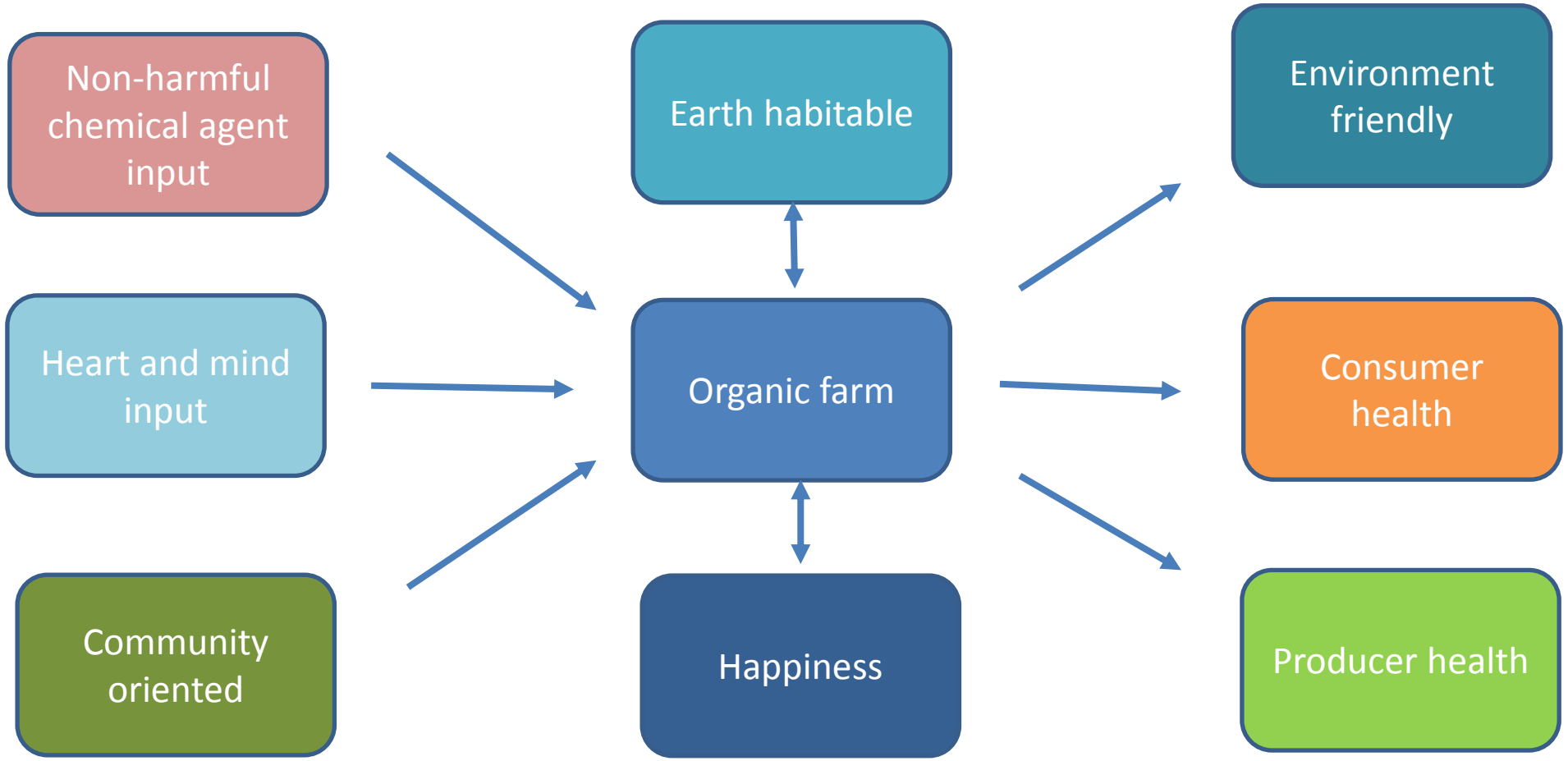
Addressing Food Insecurity	Energy Efficiency & Conservation	Organic Farming
Agritourism	Food and Agricultural Employment	Precision Agriculture (SSM)
Agroforestry	Food Labeling/Certifications	Soil Nutrient Management
Biofuels	Food Waste Management	Sustainable Postharvest Management Practices
Conservation Tillage	Genetically Modified Crops	Technological Innovation in Agriculture
Controlled Environment Agriculture (CEA)	Global Sustainable Sourcing of Commodities	Urban Agriculture
Cooperatives	Institutional Sustainable Food Procurement	Value-Based Supply Chains
Cover Crops	Biologically Integrated Farming Systems	Water Use Efficiency
Dairy Waste Management	Integrated Pest Management (IPM)	Water Quality Management
Direct Marketing	Nutrition & Food Systems Education	Zero-Emissions Freight Transport

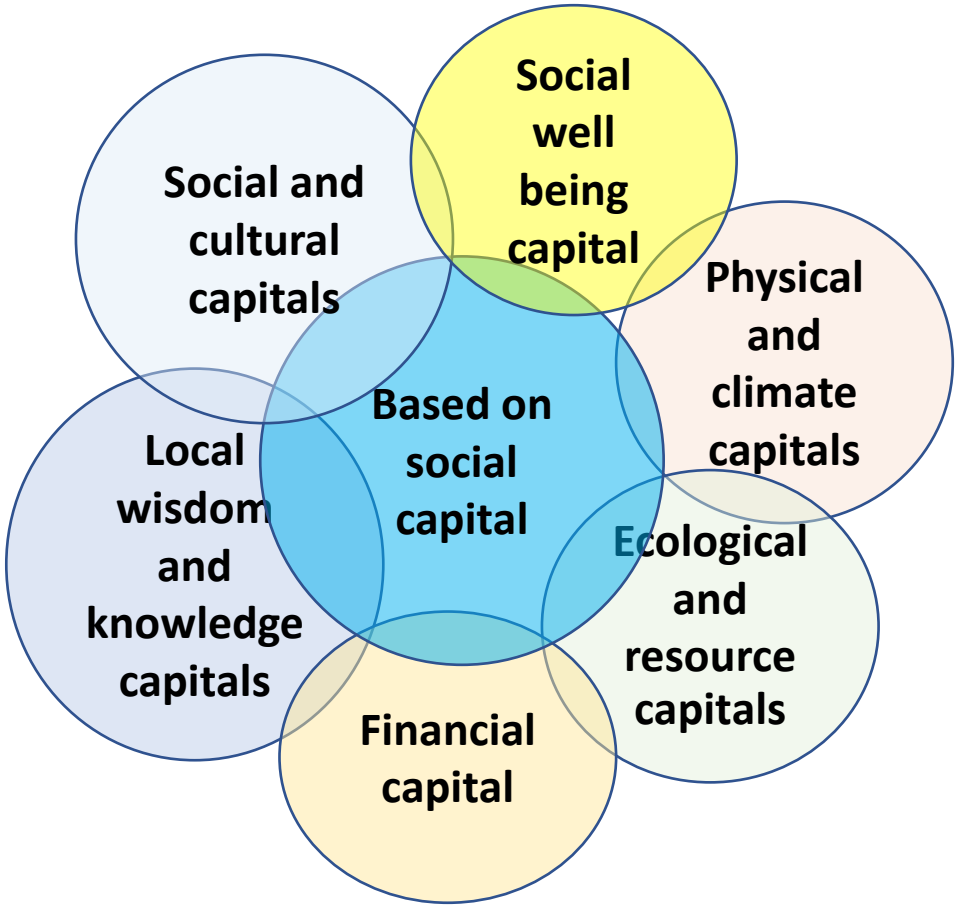


ระบบการปลูกพืชหมุนเวียนกับปศุสัตว์

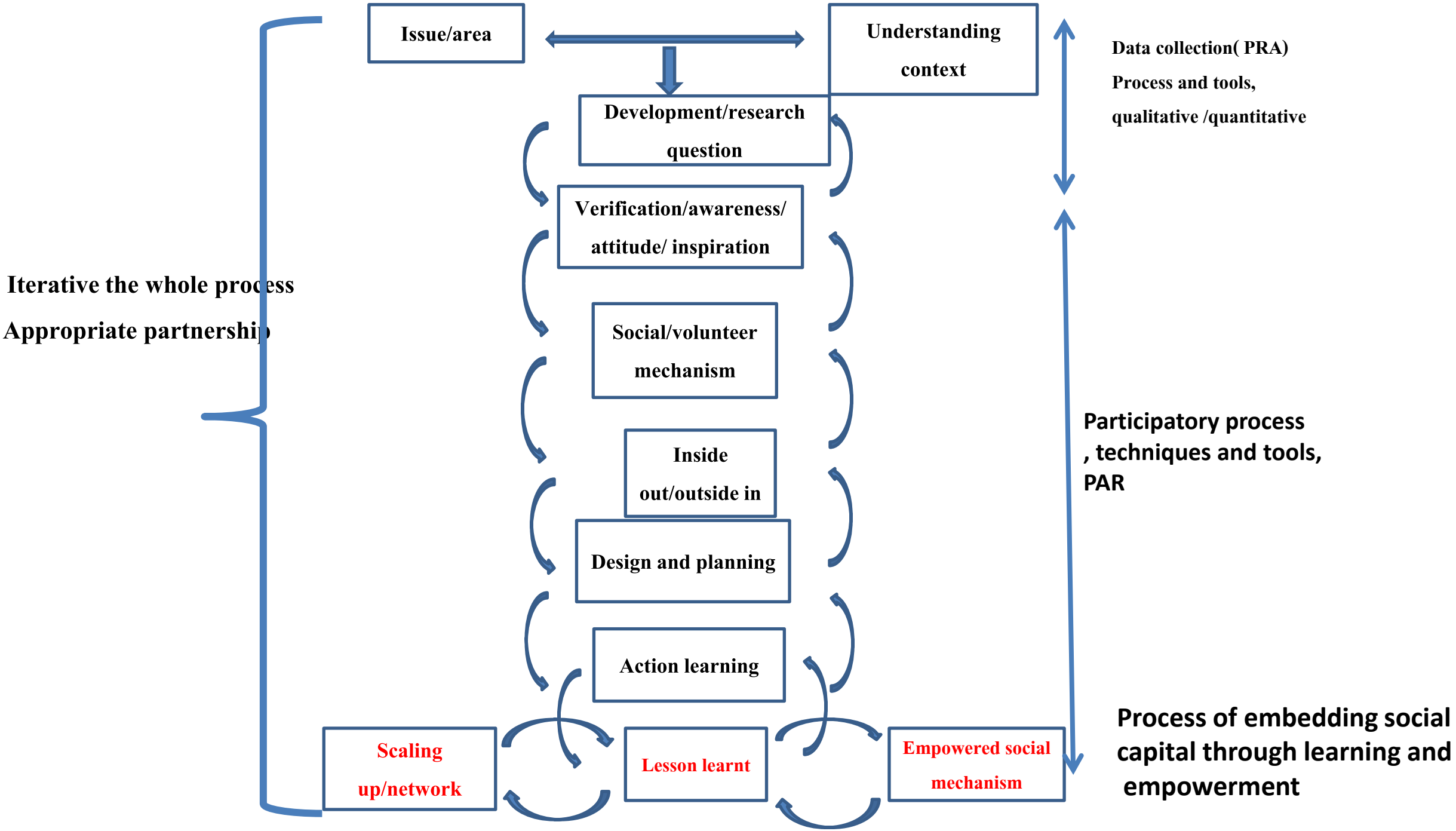
CROP ROTATION WITH LIVESTOCK SYSTEM (BENEFIT)

Organic farming for sustainable agriculture





Building up social capital for sustainable development is a key


Issue/area
Understanding context
Data collection(PRA) Process and tools, qualitative /quantitative
Development/research question
Verification/awareness/ attitude/ inspiration
Iterative the whole process
Appropriate partnership
Social/volunteer mechanism
Inside out/outside in
Participatory process , techniques and tools, PAR
Design and planning
Action learning
Scaling up/network
Lesson learnt
Empowered social mechanism
Process of embedding social capital through learning and empowerment

Leadership is important if the leader is wise

Why many Thai people still perceive Northeasterners as poor, provincial, less intelligent, suffering?

They have been living is less favorable condition for farming and have come a long way, taking great part in the country development.

Challenge on sustainable agricultural practices and standardization is not totally on the part of the farmers but also the consumers. Linking them is one of the important challenge.

Can students identify challenge issues on sustainable agriculture, Northeast Thailand

Direct and indirect issues on agricultural sustainability

-Global warming,
-Fare trade
-Country policy and strategy
-Perception on Northeasterners
-Mono-cropping
-Non-food crop
-Alternative energy
-Genetic adaptability and resource
-Resource management
-Labor shortage, aging
-Empowering farmers and social capital
-Agro-ecological design, alternative systems
-Market and marketing
-Consumer demand and linkage
-Knowledge and skill
-Research and Innovation
-Net work and partnership
-Role of NGO and GO
-Access to services
-Inequity, centralization
Etc.

A systems perspective is essential to understanding sustainability

The system is envisioned in its broadest sense, from the individual farm, to the local ecosystem, and to communities affected by this farming system both locally and globally. An emphasis on the system allows a larger and more thorough view of the consequences of farming practices on both human communities and the environment. A systems approach gives us the tools to explore the interconnections between farming and other aspects of our environment.

A systems approach also implies interdisciplinary efforts in research and education.
This requires not only the input of researchers from various disciplines, but also farmers, farmworkers, consumers, policymakers and others.

Making the transition to sustainable agriculture is a process.
For farmers, the transition to sustainable agriculture normally requires a series of small, realistic steps. Family economics and personal goals influence how fast or how far participants can go in the transition. It is important to realize that each small decision can make a difference and contribute to advancing the entire system further on the "sustainable agriculture continuum." The key to moving forward is the will to take the next step.

Finally, it is important to point out that reaching toward the goal of sustainable agriculture is the responsibility of all participants in the system, including farmers, laborers, policymakers, researchers, retailers, and consumers. Each group has its own part to play, its own unique contribution to make to strengthen the sustainable agriculture community.

The remainder of this page considers specific strategies for realizing these broad themes or goals. The strategies are grouped according to three separate though related areas of concern:
Farming and Natural Resources, Plant and Animal Production Practices,
and the Economic,
Social and Political Context.
They represent a range of potential ideas for individuals committed to interpreting the vision of sustainable agriculture within their own circumstances.

Constraints to organic farming by small holders

-Land location and topography, especially paddy hydrology, irrigation

-Physical improvement of land , especially paddy
-Household labor

-Organic matter availability, soil fertility depletion
-Neighboring adoption of organic farming

-Extension system, inspection systems, subsidy

-Pricing policy, marketing

-Standards of produces, local and international

-Networking, organization management

-Processing and linkage to market

-Paradigm shift from conventional development

Thank you