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มหาวิทยาลัยขอนแก่น
Khon Kaen University

Farming Systems Approach by Anan Polthanee

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Definition :

Farming system is a resources management strategy to achieve economic and sustained production to meet diverse requirement of farm household while a system is preserving resource base and maintaining a high level environment quality (Lal and Millar, 1990)

Definition :

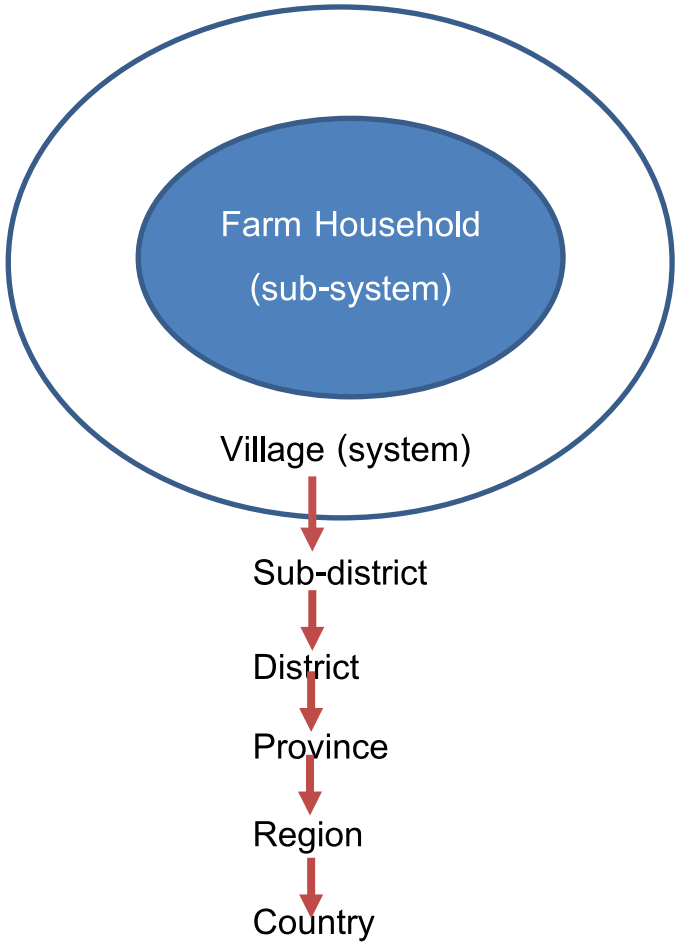
Farming system refers to a particular arrangement of farming enterprises (e.g. cropping, livestock-keeping, processing farm products) that are managed in response to the physical, biological and socioeconomic environment and in accordance with the farmers' goals, preferences and resources (Shaner et al. 1982)

Definition :

It represents an appropriate combination of farm enterprises; cropping system, livestock, fisheries, forestry and the means available to the farmer to raise them for increasing profitability (Panda, 2004)

Farming system is a complicated interwoven mesh of soils, plants, animals, implements, workers, inputs and environmental, physical, biological and social influence with the strands held and manipulated by a person called the farmers who, given his preferences and aspiration, attempts to produce outputs from the inputs and technology available to him. (Panda, 2004)

The farming system is a sub-system of a higher level land use system, such as village or water-shed



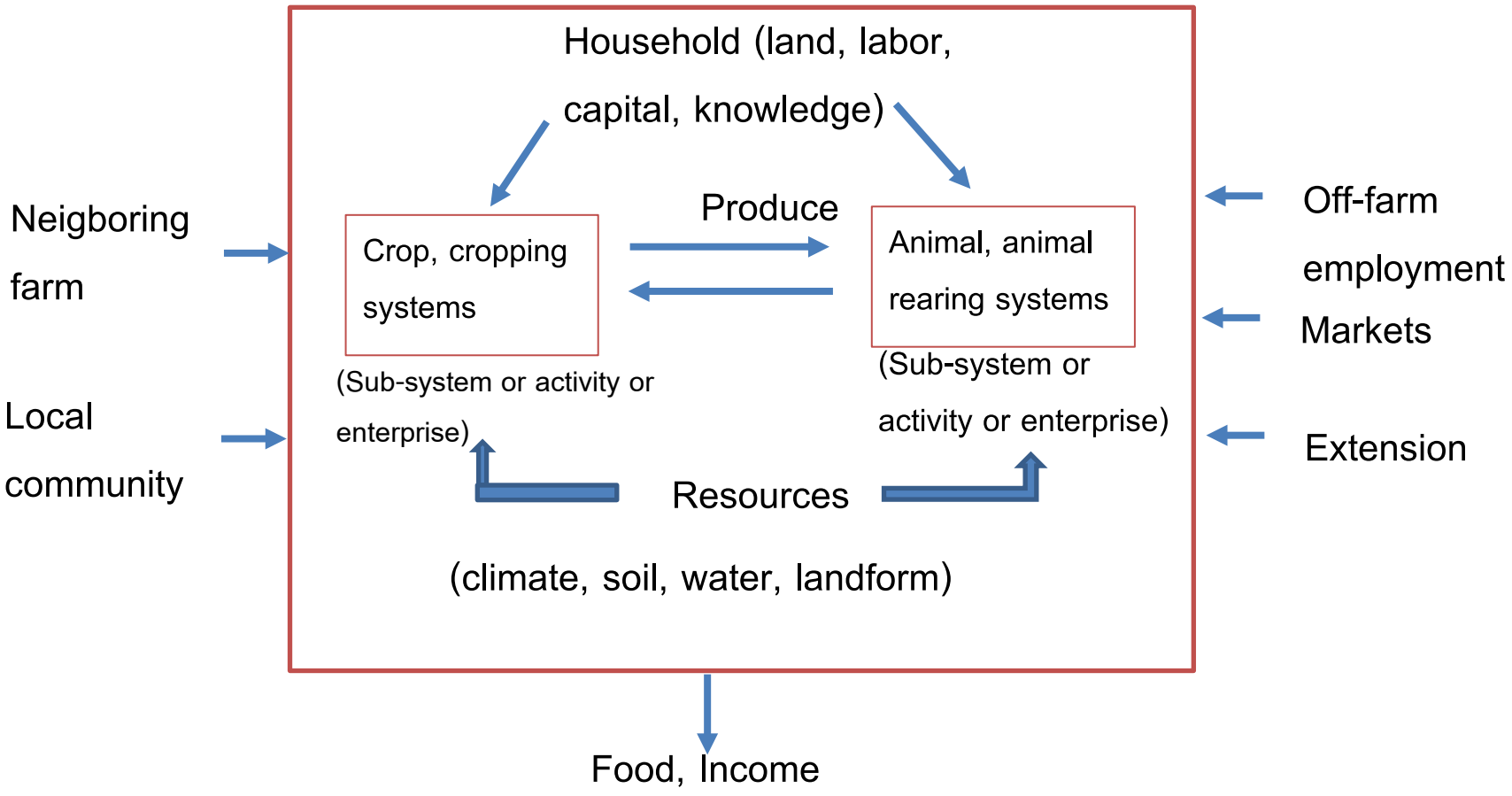
Boundary of village system

Module 2 Environmental

Ecosystem (KKU)

Scope of learning for farm household and village levels

Boundary of farm system



Farming system is the scientific integration of different farm enterprises for the efficient use of land, labour and other resources of a farm family which provides year round income to the farmers specially located in the handicapped zone (Panda, 2004)

Cropping Systems

- Mono cropping
- Multiple cropping

Mono cropping or single cropping

It is a system of growing the same crop on the same land year after year (Panda, 2004)

Multiple cropping

Growing of two or more crops on the same field in a year in the pattern of intercropping or sequential cropping.

Monocropping

Monocropping

Monocropping

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ยางแซมข้าวไร่

ยางแซมกาแฟ

ยางแซมมันสำปะหลัง

ถั่วเขียวแซมอ้อย

ข้าวนาปี – ข้าวนาปรัง

ข้าวนาปี - ถั่วลิสง

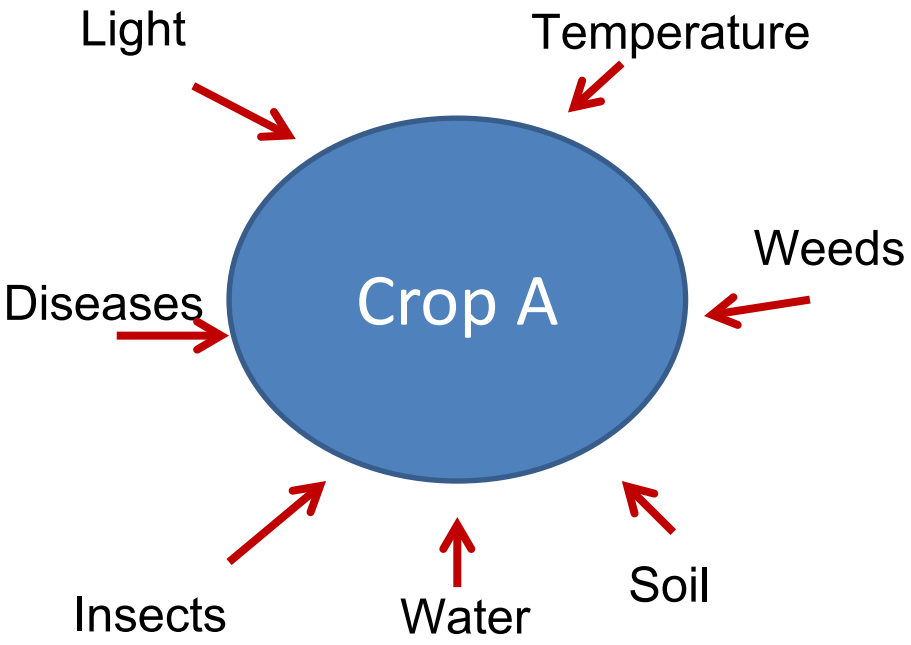
ข้าวนาปี - ถั่วเหลือง

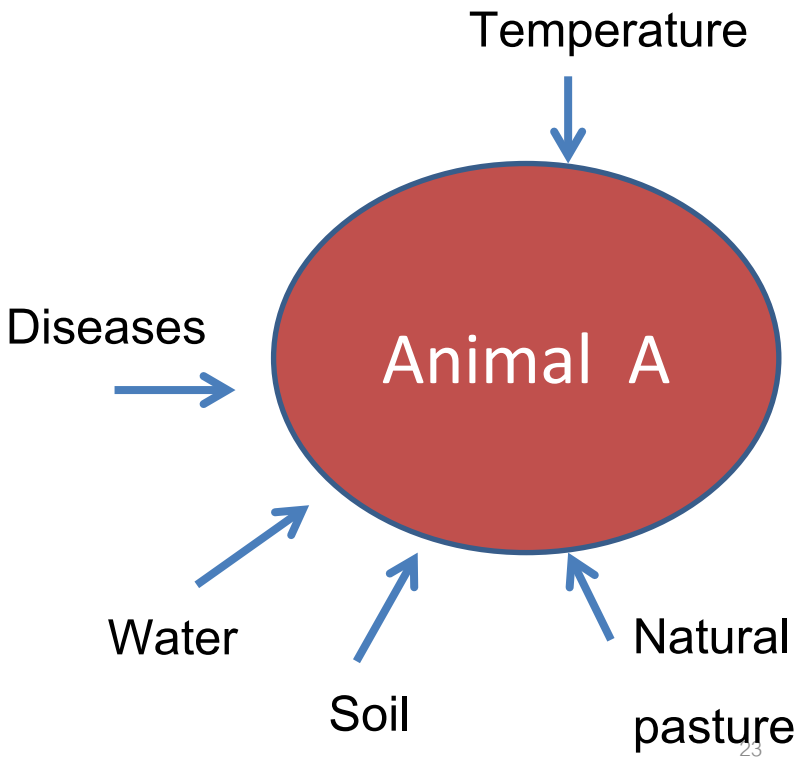
ข้าวนาปี – มันสำปะหลัง

- Intercropping is the intensification of cropping in space dimension (by increasing the production per unit of land)

- Sequential cropping is the intensification of cropping in time dimension (by increasing the production per unit of time)

Single crop or Animal system





Integrated Systems

Interaction (positive, negative)

Crop A ⟵ - - - ⟶ Crop B

- Competition
- Complementary
- Residual effects

Interaction (positive, negative)

Animal A ⟵ - - - ⟶ Animal B

⟵ - - - ⟶ Fish

Crop A ⟵ - - - ⟶ Animal A

Rainfed Farming Systems in NET

Agricultural land	56	millions rai
Irrigated areas	3.9	millions rai (7-10%)
Rainfed areas	52	millions rai (80-90%)

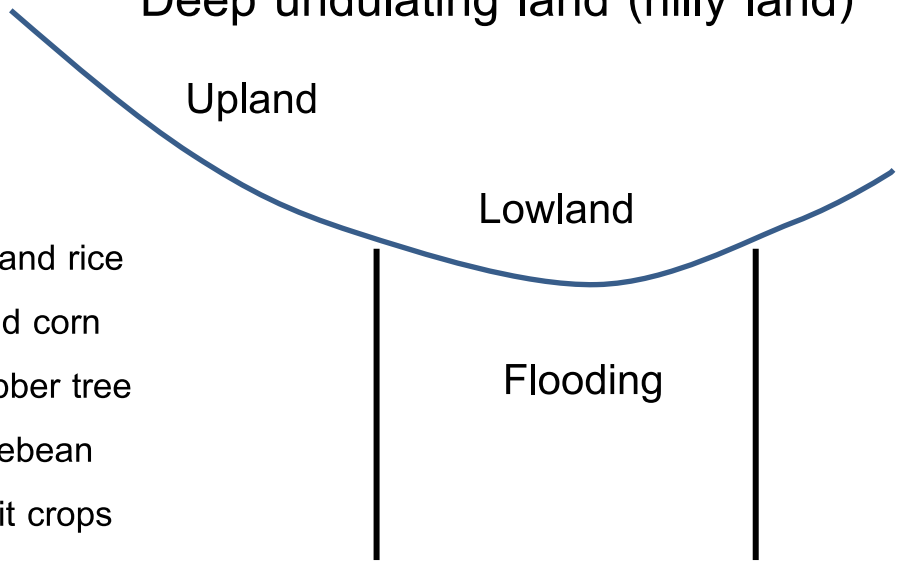
(Rainfed farming)

(Note: electric pumping 2-3%)

Landform in Northeastern (Topography)

1

Deep undulating land (hilly land)



- Upland rice
- Field corn
- Rubber tree
- Ricebean
- Fruit crops

Figure: Schematic cross section of deep undulating landform

Generalized a deep undulating landform farming

upland rice+upland crops+rubber tree (activities)

(Deep undulating land farm model)

Landform in Northeastern (Topography)

2

Shallow undulating landform (mini-watershed)

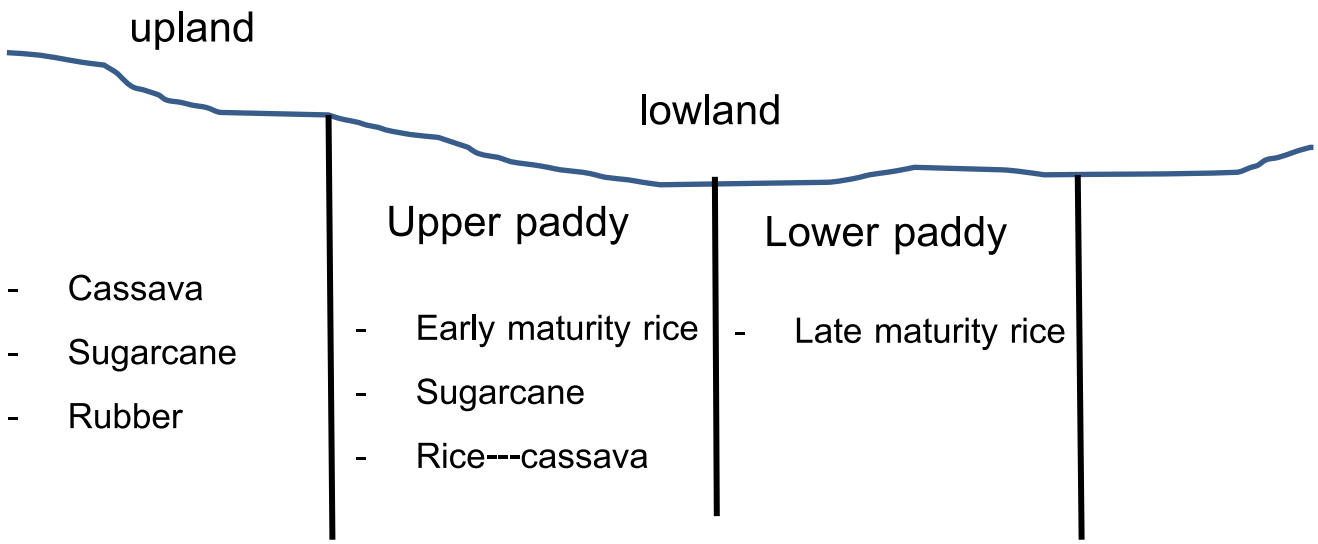


Figure: Schematic cross section of mini-watershed landform

Generalized a mini-watershed landform farming

- Upland crops+Lowland crop+Livestocks (activities)

(Mini-watershed farm model)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Non-flood plain landform (lowland)

3

upper paddy

- Rice (RD 15)
- Sugarcane
- Pasture

Flat paddy

Rice (KDML 105)

Rice---cassava

Rice---vegetables

} In limited areas

(Shallow well, farm pond)

Rice---Field corn by irrigation (goverment policy)

Figure: Schematic cross section of non-flooding plain landform

Generalized a non-flooding plain farming

Sugarcne+rice+Beef cattle+Fish (farm pond) (activities)

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Flood plain landform

4

- Rice (wet season)
- Rice (dry season) by irrigation
- Rice followed by vegetables (by irrigation)

Figure: Schematic cross section of flood plain landform

Generalized a flood plain farming

- Rice+Vegetable+Fish (activities)


08.08.2014


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Village Agricultural Systems Analysis (VAA)

The aim is to understand various aspects related to agricultural systems of the selected village (Data collection and analysis)

The typical product of VAA is a group of HH farming activities (type, model)

An Example:

Village A: mini—watershed landform

- Sugarcane+Rice (---HH)
- Cassava+Rice (---HH)
- Cassava+Rice+Cattle (---HH)
- Rice (---HH)

Data collection oat village level

An Example:

- Land use
  - Crop A (----areas, no. of HH)
  - Crop B (----areas, no. of HH)
  - Crop C (----areas, no. of HH)
- Water resources
- Household cattle rearing (%)
- Migration (%)
- Social groups, Agricultural groups
- Saline soil (areas)

Farming Systems Analysis (FSA)

This involves studying, together with farmers, the physical, biological and socio-economic environment which farm household operate (holistic approach) as well as production practices and actual farm yield.

The aim is to understand and identify the constraints limiting farm productivity and potential solutions to these problems are identified, and the results of this analysis formulated as suggestion for further action such as researcher, extensionist, policy makers and etc. (FAO, 1995)

Methodology

Conducting farm survey: Data collection (HH interview)

Data analysis (pattern analysis)

Group discussion

Key question

(problem, opportunity)

A guide to Agroecosystem Analysis

By

Dr. Gordon Conway

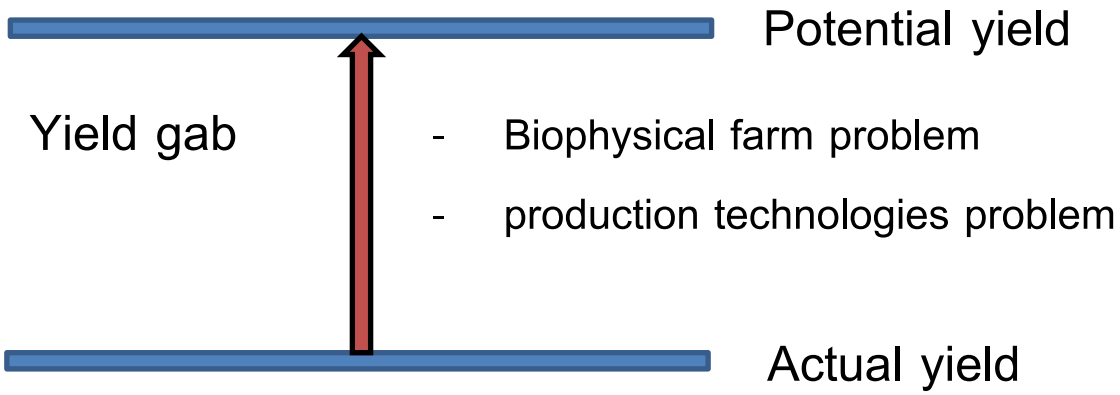
Pattern Analysis and System Properties

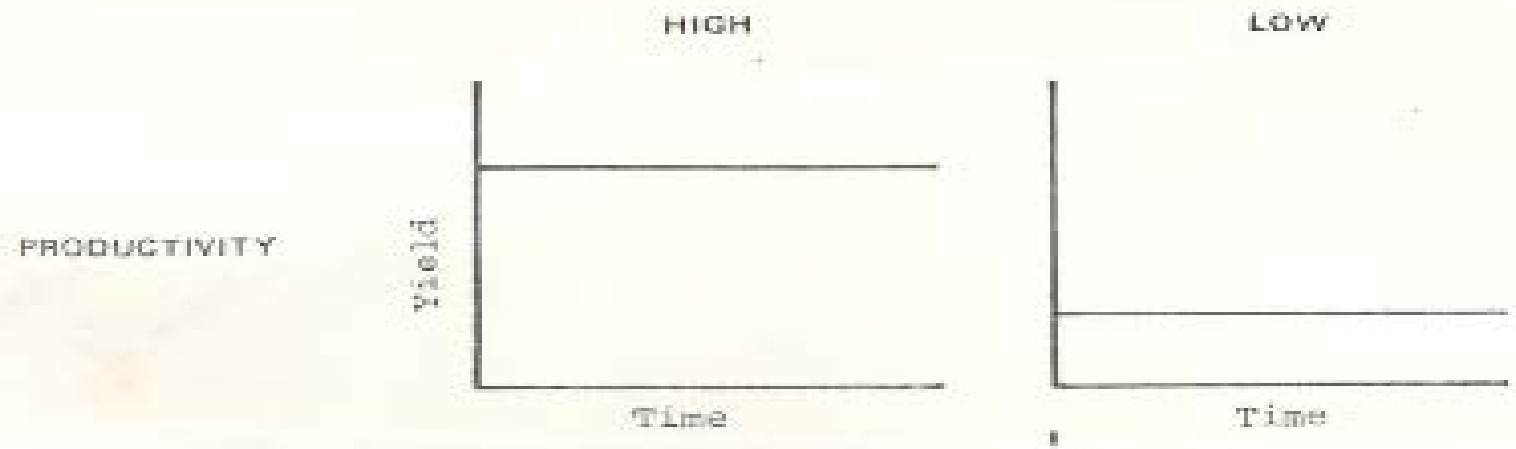
Productivity: output of a system, measured in terms of yield per unit of land, or net income

Actual farm yield (rice 250 kg/rai)

Compared with average actual farm yield at district level or province level (380 kg/rai) or potential yield 450 kg/rai (Researcher) to reference “low or high” yield

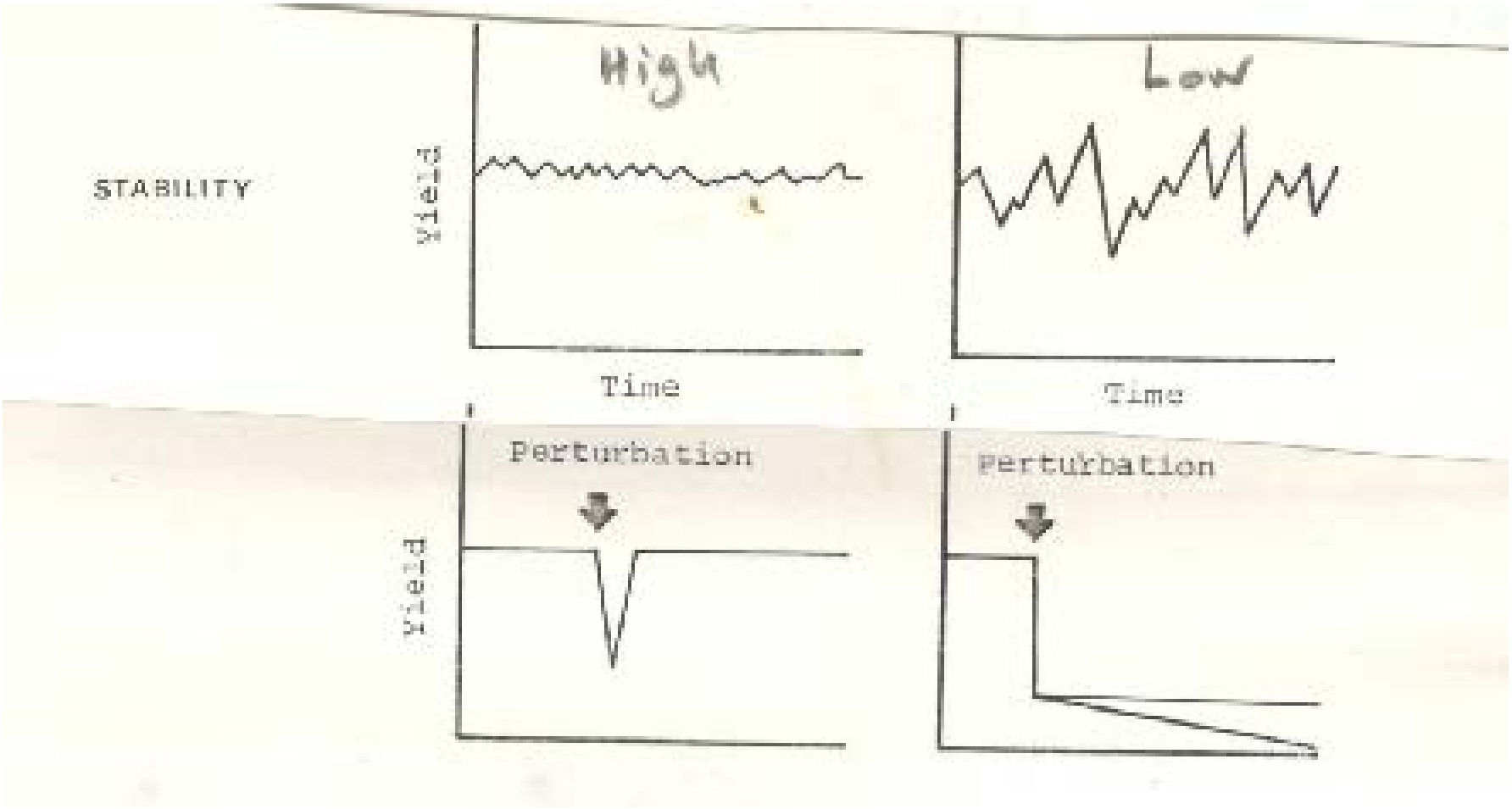
Yield gab


Potential yield
Yield gab
- Biophysical farm problem
- production technologies problem
Actual yield

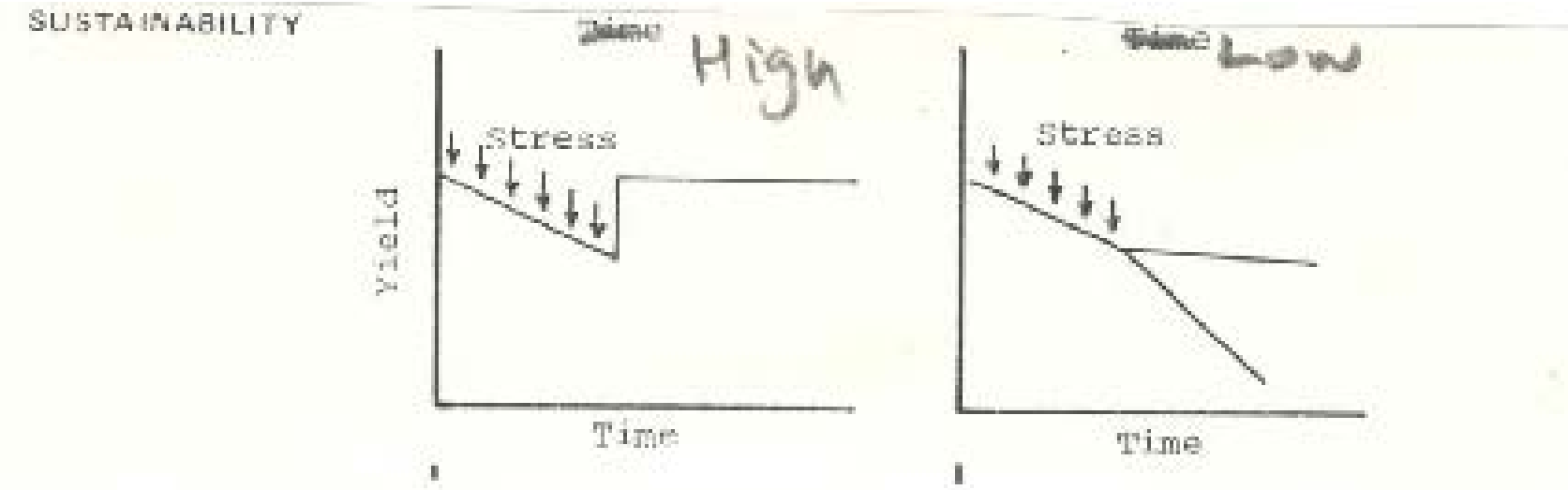

HIGH
LOW
PRODUCTIVITY
Yield
Time
Time

Stability: Property of short term homeostasis. How constant is the productivity in the face of environmental change such as drought,....

We can measure it by the variation of yield or net income


STABILITY
High
Low
Yield
Time
Time
Perturbation
Perturbation
Yield

Sustainability: This is the ability of a system to persist in the face of repeated stress or a major perturbation



Equitability: The pattern of distribution of the products of the agroecosystem among the human beings who are contained by it.

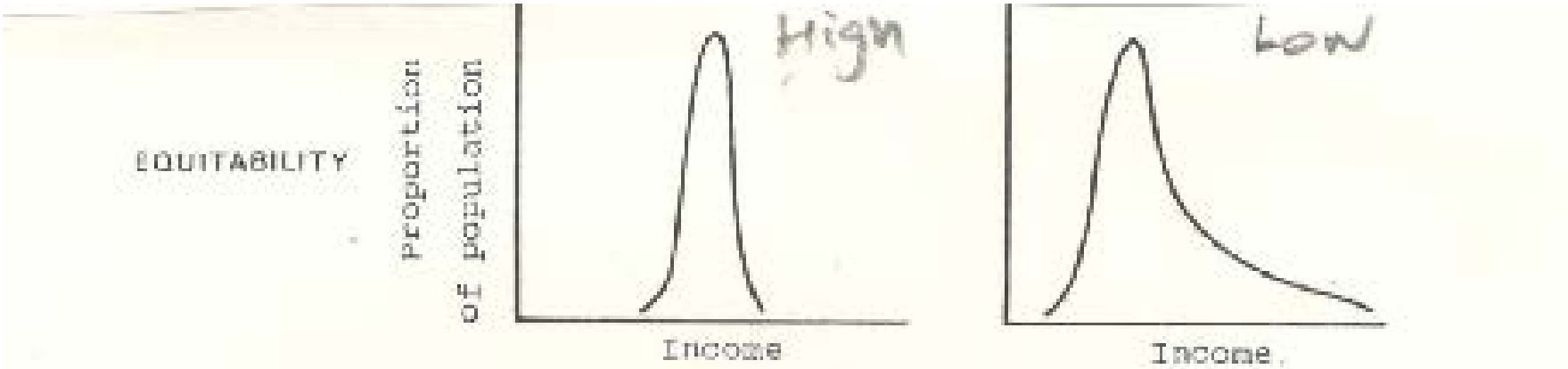


Figure 17. Agroecosystem properties.

Farming properties indicatiors

HH food security:

- Rice sufficient for home consumtion (whole year, shortage….. months)
- Rice excess for sale to generate income

Household income:

- HH income above or below perverty line 218 baht/person/day
- HH income above perverty line

Thailand classified as upper middle income country in year 2014 per capita income = 196,240 baht/person/year

↓

Target in 2021 = 301,199 baht/person/year

Household sustainability indicator

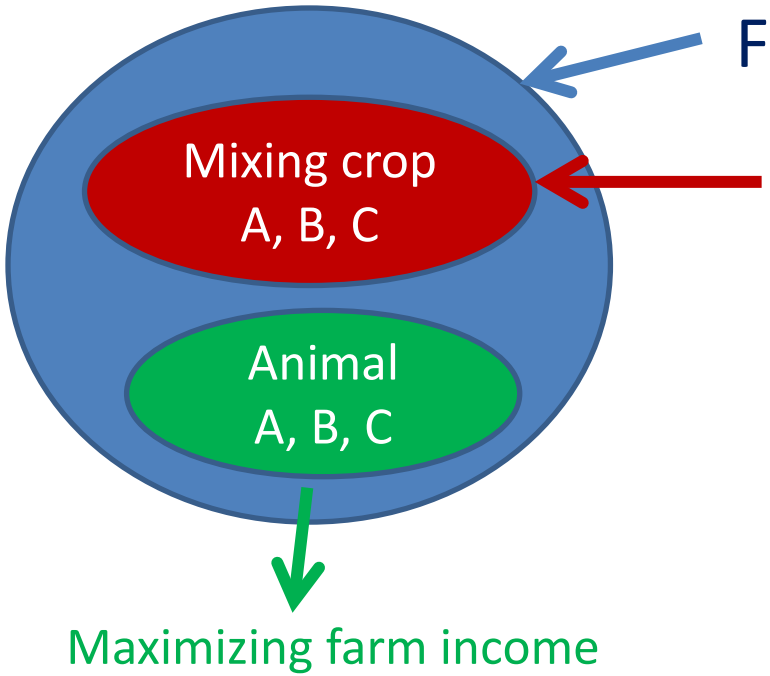
Saving money (sustainable)

Debt (no-sustainable)

Farmers making decision at farm level: A case of farm activities component in NET (some examples)

1 Profitability

- Maximizing farm income by diversification



Competition for growth factor, some crop, it may not get potential yield. But it can generate income, although, produced low yield as compared to monocropping (same crop)

- Crop A+B+C generate income> crop A
- Pigs rearing to produce manure in order to reduce production cost

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- Maximizing farm income by changing crop species
- Shift cassava crop to sugarcane in some year, on the other hand, shift sugarcane to cassava in some year caused by price fluctuation


20.02.2013

- Maximizing farm income by changing crop cultivar.
- In generaly glutinous rice (RD 6) give lower price than that of non-glutinous rice (KDML 105). Farmers decide to grow KDML 105 for sell whole paddy fields and buy rice for home consumption

- Maximizing farm income by intensive work
- Daily cattle rearing require intensive work whole days and every days. Monthly income so high as compared to other activities. However, some farmers do not prefer to do.

2 Security

- Cassava is a drought torelant crop (crop insurance), so such crop need to maintain of one component in farm (minizing the risks of production or income losses resulting from drought)
- Rice is a staple food crop. Food security is the main objective of farm households. Therefore, in some case, land is not suitable for cultivation rice. But farmers still practiced in farm.


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- Beef cattle is a low production cost (feed) and (animal insurance), as well as easy for sale and also farmers who give the price. Farmers who own only paddy field, in general, include beef cattle in farm to compensate income losses from rice due to drought

3 Productivity

shift traditional rice cultivar (Neowsanpatong) to improved rice cultivar (RD 6), due to RD 6 produced higher grain yield than that of Neowsanpaton cultivar, while similar in grain quality

Adaptation to environment changes by developing technologies: A case in NET (some examples)

- Rainfall distribution: Rainfall starting early in rainy season and continue even distribution during the early rainy season period, farmers decied to use transplanting rice (TPR), but if rainfall starting late, dry-direct seeded rice (DSR)was practices
- Family labour available: If family labour is limited, DSR planting method (broadcasting) will be practiced.

- Weed infestation in DSR

DSR, normally, face problem of weeds infestation, especially in early dry year during vegetative growth stage (no-standing water). Farmers control weeds by cutting weeds and rice. Then, rice crop can be regrowth rapidly and better weed competition.

- Nutrients soaking the cassava stem cutting (Planting material)

In some year, cassava mother stem which keep for planting material may take for long time before planting and caused low germination percentage (losses of moisture and nutrient of the stem cutting). The farmers soaked the stem cutting (15-20 cm long) in the nutrient solution before planting.


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Thank you!

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