Analyse – diagnostic des transformations des systèmes agraires en Thaïlande

Diagnostic-analysis of transformations in Thai agrarian systems

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CONTENTS

- Objectives & concept of Agrarian System (AS)
- The Development-Oriented Research on Agrarian Systems (DORAS) approach: a system & comprehensive diagnostic-analysis

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  - Agro-ecological zonation
  - Analysis of recent agricultural transformations
  - Analysis of the functioning of diverse agricultural production systems
  - Construction of a farmer typology & relationships among farm types
  - Evolution trajectories of agricultural production systems & intervention points

- Illustrations: case studies in contrasted Thai agrarian systems
  - Southern coast: Sathing Phra District, Songkhla Province (1982-83 & 1987-88)
  - Central plain: Kamphaengsaen District, Nakhon Pathom Province (1989-91)
  - Western uplands: Saiyok District, Kanjanaburi Province (1992-93)
  - Lower Northeast plateau: southern Ubon Ratchathani (1994-95 & 2005-08)
  - Northern highlands: Mae Fah Luang District, Chiang Rai Province (1994-95 & 2002-05), Tha Wang Pha District, Nan Province (2006-08)
OBJECTIVES OF PRELIMINARY DIAGNOSTIC-ANALYSIS ON AGRARIAN SYSTEMS

☆ To identify and prioritize factors & conditions determining the choice and the evolution of diverse farmers’ production systems at the regional agrarian system scale

☆ To understand how they practically interfere in the local agricultural transformations: current driving forces at work, main trends, farming systems trajectories & key problems, etc.

☆ To identify intervention points to promote agricultural development: key themes / topics tailored to the specific needs of different types of household-based production systems, suitable inflexions in agricultural policies, etc.
“An historically constituted mode of exploitation of the environment, durably adapted to the bioclimatic conditions of a given area and coherent with the social conditions and needs at that moment”
(Mazoyer, 1985; Mazoyer & Roudart, 1997)

Emphasis is on:
- The mode of artificialization of the ecosystem \(\rightarrow\) delimitation of the system boundary
- The historical evolution \(\rightarrow\) the long term is taken into account
- Focus on interactions between agro-ecological & social dynamics \(\rightarrow\) A trans-disciplinary concept
CONCEPT OF AGRARIAN SYSTEM: FOUR VARIABLES AND THEIR RELATIONSHIPS

(Source: adapted from MAZOYER, 1978)

IDEOLOGY, POLICY INSTITUTIONS

Research, Knowledge Systems,...
Cultural, Administrative, Political, Financial,...

AGRARIAN STRUCTURES

Geography, economics

AGROECOSYSTEM

Agroecology

ECOSYSTEM

Ecology & earth sciences

An holistic & transdisciplinary concept

Climate, Hydrology, Soils, Flora, Fauna
THE CONCEPT OF AGRARIAN SYSTEM: THE FOUR VARIABLES AND THEIR RELATIONSHIPS

(Source: adapted from MAZOYER, 1978)

AGROECOSYSTEM

ECOSYSTEM

MEANS FOR AGRICULTURAL PRODUCTION

Pattern of relations of ownership: land, labor, animals, machinery, capital

Type of artificialization of the cultivated environment

(production, exploitation and maintenance)

(environment, flora, fauna, hydrology, soil)

Crop varieties + breeds of livestock

Tools + machinery

Pattern of relations of ownership:

IDEOLOGY, POLICY INSTITUTIONS

Research, Knowledge Systems,...

Cultural, Administrative, Political, Religious, Financial,...

AGRARIAN STRUCTURES

(adaptation, transformation)
THE CONCEPT OF AGRARIAN SYSTEM: THE FOUR VARIABLES AND THEIR RELATIONSHIPS

Source: adapted from MAZOYER, 1978

AGROECOSYSTEM

ECOSYSTEM

AGRARIAN STRUCTURES

Pattern of relations of ownership: land, labor, animals, machinery, capital

Type of artificialization of the cultivated environment

RESOURCES FOR AGRICULTURAL PRODUCTION

Crop varieties + breeds of livestock

Tools + machinery

ECOLOGICAL RELATIONSHIPS BETWEEN AGRICULTURE, INDUSTRY, SERVICES

DIVISION OF LABOUR

PATTERN OF OWNERSHIP AND DISTRIBUTION OF THE PRODUCTS

IDEOLOGY, POLICY INSTITUTIONS

Cultural, Administrative, Political, Religious, Financial, ...

Research, Knowledge System, ...

(production, justification, regulation)

Agricultural surplus

Tools + machinery

Crop varieties + breeds of livestock

Climate

Soil

Flora

Fauna

Hydrology

(production, exploitation and maintenance)

(production, transformation)

Type of artificialization of the cultivated environment

Pattern of relations of ownership: land, labor, animals, machinery, capital

(production, exploitation and maintenance)

Agricultural surplus

IDEOLOGY, POLICY INSTITUTIONS

Cultural, Administrative, Political, Religious, Financial, ...

Research, Knowledge System, ...

(production, justification, regulation)
THE DIAGNOSTIC-ANALYSIS: ITS MAIN TOOLS

ECOLOGY/ TECHNICAL PRACTICES / SOCIAL RELATIONS / ECONOMIC DYNAMICS

PRELIMINARY DIAGNOSIS PHASE

Agro-ecological Zonation

Analysis of Recent Agricultural Transformations

APS functioning & Farmer Typology

Labour Productivity Analysis

Hypotheses on the Sustainability of the Different Type of Agricultural Production Systems (APS)

Hypotheses on a Hierarchy of Constrains / Potentialities per Main Agro-ecological Zone & Type of APS

Hypotheses of Key Bio-Physical, Social & Economic Limiting Factors of Production Processes Per Main Agro-ecological Zone & per Type of Farmer
FROM PRELIMINARY DIAGNOSIS TO INNOVATION

PHASE OF DESIGN AND TESTING OF ADAPTED INNOVATIONS

The hypothesis can be translated into a precise scientific question

More information is required

Direct Search for Adapted Solutions

SPECIFIC ON-FARM SURVEY to refine and test the hypothesis

Already Available

EXTENSION to target APS

EVALUATION of their adoption

Not Available Yet

TRIALS for production of adapted references (station, on-farm, lab.)

Critical appraisal, refinement of the initial diagnosis

New Topic
CHARACTERISTICS OF ADAPTED INNOVATIONS

SOCIALLY ACCEPTABLE
ECONOMICALLY Viable
TECHNICALLY FEASIBLE
INSTITUTIONALLY SUSTAINABLE

FARMER ADOPTION
AN TRANSDISCIPLINARY & MULTI-SCALE INVESTIGATION PROCESS

Dominant Approaches & Domains in the Diagnosis

Analytical approach

- Geographical
- Agro-ecological
- Historical
- Agronomic

Aggregative approach

- Political
- Cultural
- Economic
- Social

DOMAINS:
- COUNTRY
- REGION
- VILLAGE
- HOUSEHOLD
- FIELD
- FIELD STATION

SYSTEMS:
- Production System

METHODS:
- Historical
- Social
- Cultural
- Economic
- Agronomic
- Geographical
- Agro-ecological
DEVELOPMENT-ORIENTED RESEARCH IN AGRICULTURE PROCESS

Key concepts, Approaches & Domains in the Diagnosis

AGRICULTURAL AGRARIAN SYSTEM

**Analytical approach**
- Geographical
- Agro-ecological
- Historical
- Agronomic

**Aggregative approach**
- Socio-economic

COUNTRY

REGION

VILLAGE

HOUSEHOLD

FIELD & HERDS

FIELD STATION

FARMING SYSTEM

CROPPING & ANIMAL REARING SYSTEMS

PRODUCTION SYSTEM

FIELD & HERDS
Several diagnostic-analyses on regional agrarian systems implemented in Thailand during 1981-2008

- Southern coastal area / rainfed (1981-1987)
- Western lowlands & uplands / irrigated + rainfed (1992-1993)
- Lower & upper Northeast plateau / rainfed (1994-95 & 2005-08)
- Upper Northern highlands / rainfed (1994-985 & 2002-08)
Sathing Phra, Songkhla province, South (Eastern)
Irrigated delta & lower terrace system

Western Central Plain, Nakhon Pathom & Kanjanaburi Provinces
Drought-prone Rainfed Lowland Rice system

Ubon Ratchathani province, Lower Northeast Thailand
Drought-prone Rainfed Lowland Rice & industrial cash crops system

Ban Pong district, Khon Kaen Province, Upper Northeast
Transitional highland swiddening system

Chiang Rai province, Upper Northern Highlands
REGIONAL LEVEL (AGRARIAN SYSTEM)

- Analysis of Recent Transformations
- Farmer Typology, Trajectories
- Survey on Farmer Production Processes

FARM DIVERSITY

HISTORY

BIO-PHYSICAL CONDITIONS

Agro-Ecological Zonation
AGROECOLOGICAL ZONATION ALONG A W-E TRANSECT

SATHING PHRA AREA, SONGKHLA PROVINCE, SOUTHERN THAILAND - 1986

Based on aerial photos.
AGROECOLOGICAL ZONATION ALONG A W-E TRANSECT
SATHING PHRA AREA, SONGKHLA PROVINCE,
SOUTHERN THAILAND – UPDATING LAND USE

SPOT satellite image, June 2011

Use of such document in participatory mapping with local stakeholders
AGROECOLOGICAL ZONATION & LUCC: upper Maeklong valley, Kanjanaburi province, Western Thailand

1970-1979
Phase of conversion of mixed deciduous Forest Into upland crop growing areas / Pioneer front

1979-1989
Phase of expansion of industrial cash Crops (maize, sugarcane, cassava) & Introduction of perennial plantations
AGROECOLOGICAL ZONATION & LAND USE CHANGE: Upper Maeklong valley, Kanjanaburi province, Western Thailand
TIME & VARIABILITY:
CROP YEAR ZONATION
Upper Maeklong valley, Kanjanaburi province, Western Thailand

Frequentential Climatic Analysis

Cropping Calendar
- Maize
- Cotton
- Sugarcane
- Cassava

PET
½ PET

Mm/10d

Jan  May  Oct
To distinguish & characterize the main changes of agricultural production processes in the past decades

To identify causes of differentiation among farmers & their agricultural production systems
STUDY OF REGIONAL AGRICULTURAL TRANSFORMATIONS: DATA ANALYSIS

1- Descriptive inventory of main changes

2- Analysis of relationships & determining factors of change:

- Nature
- Origin
- Cause
- Extent
- Consequences
STUDY OF REGIONAL AGRICULTURAL TRANSFORMATIONS:
DATA ORGANISATION

ECOLOGICAL EVENTS

AGRICULTURAL PRODUCTION SYSTEMS
- Means of production
- Techniques applied
- Productions

SOCIO-ECONOMIC COMPONENTS
- Demographic pressure
- Marketing conditions
- Farm supplies (inputs, equipment)
- Rural credit patterns
- Land tenure patterns
- Labor market
- State intervention
- Farmer income, productivity
AGRICULTURAL TRANSFORMATIONS: Change in non rice land use in Ban Hin Lad, Khon Kaen Province, Upper NE Thailand

Typical succession of industrial crops over second half of XXth century
AGRICULTURAL TRANSFORMATIONS: Change in livestock rearing systems due to moto-mechanization in Ban Hin Lad, Khon Kaen Province, NE Thailand

![Graph showing the number of cattle and buffaloes over the years from 1975 to 1995. The graph indicates a decrease in the number of buffaloes and a slight increase in the number of cattle.](image-url)
AGROECOLOGICAL ZONATION & CROP-ANIMAL INTERACTIONS: FEEDING LIVESTOCK IN BAN HIN LAD, KHON KAEN PROVINCE
### The Historical Profile: Principles & How to Read It

<table>
<thead>
<tr>
<th>Agro-ecological Transformation of Cropping / Animal Rearing Systems</th>
<th>Economic, Social, Policy Changes in Farm Environment / Social Relations</th>
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<tr>
<td>1950</td>
<td>Determine</td>
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<td>1970</td>
<td>Large-scale change of farmers’ practices</td>
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<td>1980</td>
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<td>1990</td>
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<td>2000</td>
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TIME
THE SEQUENCE OF AGRICULTURAL SYSTEMS:
Ex. OF KAMPHAENGSAEN DISTRICT, NAKHON, PATHOM PROVINCE, CENTRAL DELTA THAILAND

A.S.1 Before 1930
A.S.2 1930-1950
   Roads
A.S.3 1950-1980
   Sugarmills / cane prices
A.S.4 1980-........
   Irrigation + Market integration
ORIGIN & IMPORTANCE OF FARM DIVERSITY

SOCIO-ECONOMIC CHANGE IN THE FARM ENVIRONMENT

TRANSFORMATIONS OF THE AGRICULTURAL SYSTEM

INCREASED DIVERSITY & FARMER DIFFERENTIATION

FARMER TYPOLOGY, TRAJECTORIES OF EVOLUTION + INSTITUTIONAL & STAKEHOLDER ANALYSES
INSTITUTIONAL FRAMEWORK OF A COTTON-BASED AGRICULTURAL SYSTEM RESEARCH PROJECT IN KANJANABURI PROVINCE, WESTERN THAILAND

Source: J.C. Castella, 1995
FARMING HOUSEHOLD LEVEL (AGRICULTURAL PRODUCTION SYSTEM)

Analysis of functioning of diverse types of A.P.S.:
- Main orientation
- Strategy (re. income, labour, risk, etc.)
- Key decision-making processes
THE AGRICULTURAL PRODUCTION SYSTEM: A DEFINITION

**APS:** “the whole structured set of plants, domestic animals and other productions or activities selected by a farmer and his family for his production unit to achieve his objectives”

(M. Sebillotte; Capillon & Manichon)
FUNCTIONING OF THE AGRICULTURAL PRODUCTION SYSTEM

FAMILY .................................................................................. FARMER

LOCAL & GLOBAL SOCIO-ECONOMIC ENVIRONMENT

OBJECTIVES

BIO-PHYSICAL ENVIRONMENT

ADOPTION OF STRATEGIES

CHOICE OF A PRODUCTION SYSTEM

ANALYSIS OF THE APS FUNCTIONING

INCOME
CASH MANAGEMENT

FARM LABOR
LABOR CALENDAR

TECNICAL EFFICIENCY

* JUDGMENT ACCORDING TO FARMER’S OBJECTIVES AND STRATEGIES
* ABILITY OF THE APS TO CONTINUE

Source: M. Sebillotte, 1988
STAGES OF THE GUIDELINES FOR APS ANALYSIS

- FAMILY / OBJECTIVES (S2)
- HISTORY : MAIN PHASES (S7)
- PRODUCTION COMBINATION (S1)
  - LANDS / PLOTS (S3)
  - LABORFORCE (S4)
  - EQUIPMENT (S5)
    - SOCIO-ECONOMIC ENV. (S6)

(S8) DETERMINANTS:
- 
- 

(S9) DECISIONS

(S10) FUNCTIONING OF THE A.P.S.
PRESENTATION OF THE APS STRATEGY

FAMILY SITUATION & ITS OBJECTIVES

STRATEGY: main orientation of the APS to achieve its objectives in the given conditions of production

<table>
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<tr>
<th>CHOICE OF PRODUCTION</th>
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<table>
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<th>CHOICE OF MANAGEMENT</th>
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<th>TECHNICAL CHOICES CONCERNING THE PRODUCTION SYSTEM</th>
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FAMILY SITUATION AND OBJECTIVES

FARMING SYSTEM SIZE
Farmed area: Land / labour

TECHNICO-ECONOMIC PERFORMANCES

Characteristics of the production system and environment which determine farmer’s choices:

AS STRATEGIC CONSTRAINTS
AS STRATEGIC POTENTIALITIES

STRATEGY: Orientations of the farming system to achieve the objectives in the given conditions of production

CHOICE OF PRODUCTIONS
CHOICE OF MANAGEMENT
CHOICES CONCERNING THE PRODUCTION SYSTEM

FARMER’S AND FAMILY PROJECTED IMPROVEMENTS

Micro-economic assessment:
Gross Product / Intermediate Consumptions / Depreciation Fixed Capital / Net Value Added / Family Income
DYNAMICS OF LABOUR PRODUCTIVITY, SATHING PHRA AREA SONGKHLA PROVINCE, SOUTHERN THAILAND - 1988

LABOUR PRODUCTIVITY (X 1000 BATH/WORKER)

POTENTIAL OF PALM SUGAR + RAINFED LOWLAND RICE SYSTEM

RAINFED RICE

Farm wage threshold
(annual income of local wage earner)

Basic needs threshold
(Worker's basic needs for one year)

HIRED TRACTOR OR HAND TRACTOR OR OXEN

3 5 8 10 15
RAI / WORKER

<table>
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<tr>
<th>FARM TYPE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
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<tr>
<td>FREQUENCY</td>
<td>60%</td>
<td>20%</td>
<td>15%</td>
<td>5%</td>
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LABOUR PRODUCTIVITY DYNAMICS IN RAINFED LOWLAND RICE, SATTHING PHRA, SONGKHLA PROVINCE, SOUTH THAILAND 1982-83 / 1987-88 CROP YEARS

PADDY PRODUCTION (TON)/FAMILY WORKER

Accumulation threshold

NUMBER OF RAI /FAMILY WORKER IN AGRICULTURE

Legend: Types of APS: + = A • = B □ = C □ = D

W = wage earner

Evolution of labor productivity according to farmers' productive resources among 10 APS in Sathing Phra area between 1982-83 and 1987-88 crop years.
RAPID ADOPTION OF IMPROVED TECHNOLOGY FOR PALM SUGAR PRODUCTION IN, SATHING PHRA DISTRICT, SONGKHLA PROVINCE, SOUTH THAILAND

Number of improved pan stoves per tambon in 1988
FARM DIVERSITY & FARMER DIFFERENTIATION: MAIN FARM TYPES, Ban Hin Lad, Khon Kaen Province, Upper NE

Composition of family income / type of farm

- **Type A**: Very small farm of off-farm workers (1.6)
- **Type B**: Small family farm (4.8)
- **Type C**: Large family farm (9.8)
- **Type D**: Entrepreneur (9)

Year: 1983 - 2001

(Average farm size in ha)
LABOUR PRODUCTIVITY & SUSTAINABILITY OF APS TYPES IN BAN HIN LAD VILLAGE, KHON KAEN, UPPER NORTHEAST

Farm income/family labor ($ US.year$^{-1}$.labor$^{-1}$)

- A1: Farms of permanent outside workers
- A2: Farms of seasonal outside workers
- B: Small family farms
- C: Family farms with wage-earners
- D: Contractors

Accumulation threshold
Off-farm opportunities threshold

Farm area/labor (ha.labor$^{-1}$)
LABOUR PRODUCTIVITY & SUSTAINABILITY OF APS TYPES IN BAN HIN LAD, KHON KAEN PROVINCE, UPPER NORTHEAST THAILAND

Total income/family labor ($ US.year\(^{-1}\).labor\(^{-1}\))

- **Wage earning threshold**
- **Satisfaction of basic needs & subsistence threshold**
DIFFERENTIATION AMONG LOCAL HOUSEHOLD SYSTEMS: Upper Maeklong valley, Kanjanaburi province, Western Thailand
Market integration Phase 1: Low value low input annual cash crops
TRAJECTORIES OF APS IN Mae Salaep Akha village, MAE FAH LUANG DISTRICT, CHIANG RAI, UPPER NORTHERN HIGHLANDS

Market integration Phase 2: High value high input high (risk) perennial cash crops

Lychee (3-70 Bahts/kg) → For secured investors (type C)

Green tea (6-12 Bahts/kg) → « Poor man perennial crop »
TYPOLOGY OF MAIN APS CATEGORIES in Mae Salaep, MAE FAH LUANG DISTRICT, CHIANG RAI, UPPER NORTHERN HIGHLANDS

• **A:** small farms, often newcomers or young families, mainly on steep land, main orientation: annual cash crops

• **B:** medium-sized farms, conservative behaviour, mainly subsistence crops & low input cash crops

• **C:** largest holdings, often early settlers with access to best land (terraced paddies), market oriented, diverse combinations of on & off-farm productions & activities
Figure 3. Trajectories of evolution for farming systems in Mae Salaep Lang, Chiang Rai Province, upper northern Thailand.
PLOT OR HERD LEVELS (CROPPING OR ANIMAL REARING SYSTEMS)

- ENVIRONMENT
- CROP SUCCESION
- CROP MANAGEMENT (COST, LABOR EQUIPMENT)

Yield x zone x climate relationships

AE Zonation

Frequential climatic analysis

Limits of factorial trials to study of interactions
Cropping System (CS): “the succession of techniques performed on a plot managed in an identical way. Each cropping system is defined by:

- the **crop species** and their **succession order**, 

- the **crop management & techniques** applied to these several crop populations, including the varietal choice”

*Source:* M. Sebillote, 1990
Production of adapted technical References, validated at regional level (per AEZ & type of APS)
MAIN CHARACTERISTICS OF THIS APPROACH

★ TRANSDISCIPLINARY SYSTEM ANALYSIS: understanding of interactions > detailed knowledge of system components
  Ecological & Technical ←----- Social & Economic

★ Emphasis on HISTORICAL aspects at every scales:
  - National & Regional agricultural transformations
  - APS evolution and phases
  - Plot management history

★ A COMPREHENSIVE & MULTI-SCALE/LEVEL approach to on-farm diversity with key tools to stratify complex realities:
  - Zonation (inter-ecosystems, inter-farms & intra-plot heterogeneity)
  - Typologies (farmer categories, crop environment situations)

★ Proposed interventions GROUNDED in actual on-farm circumstances
Focus on agricultural production processes / multifunctional character of agriculture → NEED TO BETTER TAKE ENVIRONMENTAL PROBLEMS INTO ACCOUNT

Based on an expert approach & recommendations → NEED TO ARTICULATE WITH COMPLEMENTARY APPROACHES FACILITATING SHARING OF POINTS OF VIEW, CO-LEARNING, ACTUAL CHANGE, COLLECTIVE PLANNING & ACTION

Improve the feedback of findings to farmers & decision-makers → TO EMPOWER THEM TO ACT & ENGAGE IN LOCAL ADAPTATION – TRANSFORMATION OF THEIR AGRARIAN SYSTEM


