

A typology of resource use adaptation among rice-farming households in Asia.

1. Categorising livelihoods

The use of typologies as a mechanism to assist in the targeting of policies, interventions and adoption of technologies is widespread, and well established. These household typologies have two functions. The first is to identify different resource functions, livelihood portfolios, and, consequently, different options and potential for adaptation. The second function is to scale up from the household level to support policy development at higher levels. Ideally, a household typology is a description of different types of households that is simultaneously locally relevant (to the extent that farmers can relate their own livelihood conditions to one type) and regionally relevant (that is, types can be extrapolated to similar geographical areas).

Dorward et al. (2009) have developed a categorisation to capture livelihood strategies of poor farmers and to focus on agriculture within a rural development context. Livelihood strategies are defined as the attempt to match limited resource availability with consumption demands, while also allowing for unexpected falls in their resource supply or increases in their demand". Hence, livelihood strategies make best use of available resources while being culturally acceptable and mitigating risk. The following assumptions are proposed: (1) livelihood strategies maintain current consumption patterns, with an aim to improve them when possible; (2) improvement occurs either (a) by expanding current livelihood activities or (b) moving into new activities (*ibid.*).

Typical strategies applied to either (a) maintain current livelihood status or (b) improve resource functionality are either, or a combination of:

- Diversification, either of the farming system or of livelihood activities
- Specialisation, usually of crops or other agricultural products
- Livelihood transformation, out of farming

In each of these processes we are able to observe a transformation of resources and/or of the resource functions.

(A) Transformation of resources: Adaptation, essentially, expands the resource base or increases the efficiency of resource use. Following Georgescu-Roegen, we differentiate between *fund* and *flow* resources. Fund resources are fixed at any given time (e.g., in our case: land and labour); flow resources, on the other hand, vary depending on the volume of flow and can be more easily transformed (e.g., water can be used for irrigation of various crops, for livestock or for generating energy; income can be invested for various purposes).

(B) Transformation of resource functions: In addition to amount and efficiency, the meaning of resources can be transformed in adaptation. For instance, to a subsistence farmer, land is the source of food, to a wealthy farmer, land is a source of income and to an urban dweller, land can be an object of speculation.

2. Four Livelihoods Systems

The typologies developed for rice-farming households in 4 countries of Asia focus on the transformation of resources, i.e., they measure the resource base and the efficiency of its use. However, the transformation of resource functions can be applied in the analysis of different types, i.e., between any two types, resource functions are likely to be different. Therefore, the concept of resource functions help to interpret and explain types within the typology. The following case studies have been applied:

- Andhra Pradesh, India: mixed rice-cash crop farming system characterised by drought and stringent hierarchies limiting social mobility.
- Khulna, Bangladesh: coastal rice cultivation characterised by soil salinity, high levels of landlessness and traditional patron-client systems.
- Savannakhet, Laos: integrated crop-livestock systems, characterised by seasonal flooding and high levels of (female) labour migration.
- Svay Rieng, Cambodia: rice cultivation, characterised by small household land size and high levels of labour migration.

Initially, a typology of households had been developed for each case. The object of the current analysis is to combine the respective typologies.

	Hanging in (status quo)	Stepping up (increase of activities/assets)	Stepping out (new activities/assets)	Falling down & out (failure to maintain)
India	Resource poor, social capital low, subsistence oriented	Family labour, mixed resource base, diversified, willing to intensify production	Diversified, willing to specialise/move out of ag, invest into education	Landless, competition with other industries draws them out of Ag
Bangladesh	low resource base, remote	diversified, high social capital, market access	<i>landless</i> → migrate to other areas <i>wealthy</i> → non-farm businesses	marginalised, social capital low, high salinity, landless or remote
Cambodia	low resource base, no irrigation	supplementary irrigation (at least potential), potential to diversify/intensify	debt + small land size → migration	
Laos	low resource base, limited family labour, no irrigation	large land size or irrigation, non-farm or migration	migration/non-farm can lead to giving up Ag	non-sufficient, Ag is subsidies by migration
	→ “smallholders”	→ “farmers of the future”	→ “migrants or rural businesses”	→ “proletariat”

Table 1: A meta-typology applying Dorward’s (2009, 2013) framework for 4 selected case studies among rice farming systems in Asia.

Dorward’s (2009, 2013) livelihoods framework helps define four “meta-types” which can be said as being common across the 4 case studies (Table 1). These meta-types help to understand the commonalities among rice farming

smallholders in Asia but they also serve to narrow down the target population for development interventions (technology, practice change, infrastructure development, institutional reform) to those farmers likely to remain in farming for the next foreseeable period.

3. Impredicative Loop Analysis

The resources, along which the meta-types were analysed include, both, fund resources (land, labour) as well as flow resources (water, income). Land and labour are crucial to be able to conduct farming, whereas water and income determine *how* fund resources are used and applied.

1. Land – defines whether food requirements can be met and surplus can be achieved
2. Water – access to water is critical in adopting more productive farming systems and adapting to climate variability
3. Labour – defines whether the physical resources can adequately be utilised and other livelihood activities conducted
4. Income – determines whether it is possible to invest (inputs, technology, infrastructure) into the farm system

Fig. 1 plots data of 2 different meta-types against the 4 resources. The two examples are a representation of the difference between a “hanging in” type (orange shading) vs. a “stepping up” type (grey shading). A subsistence household – or “hanging in” type might have just enough farmland to feed the family, just enough labour to work the available land, income to cover the agricultural inputs, and rely on natural precipitation. A “stepping up” type, on the other hand, might be able to lease additional land, use surplus labour to add value to crops or engage in wage labour, invest income into irrigation systems, and use additional irrigation to achieve two harvests, rather than merely a rainfed one.

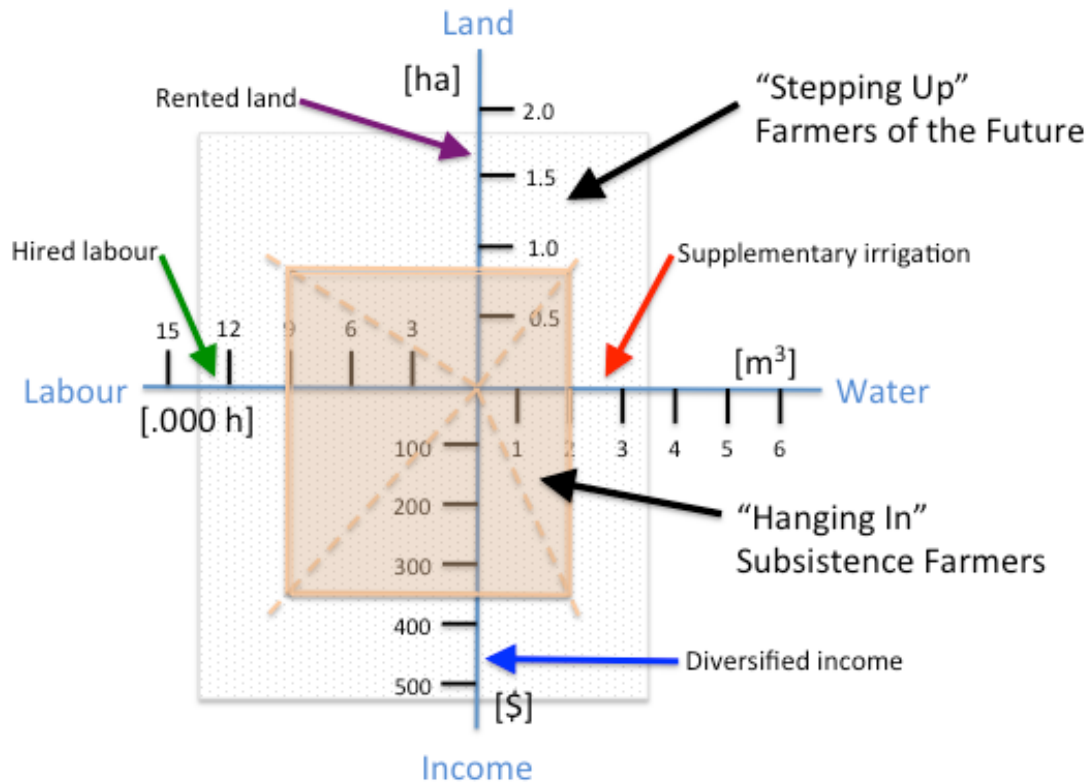


Figure 1: Impredicative Loop Analysis of critical resources among rice-farming households. Two types of households (“Hanging In” and “Stepping Up”, cf. Table 1) are plotted against four resources (adapted from Giampietro 2004).

4. Utility of the Method

This research is designed to link in with farm-level scenarios using crop models and on-farm trials. Ideally, such scenarios relate to an individual household type and are thus relevant to farmers that identify with such a type. In this way we produce options for groups of farmers without having to develop individualised solutions but keeping them relevant to the end users concerned.

By describing the household types using quantifiable variables and relating those to available statistics, the research supports the communication of adaptation options to policy makers. When abstracted from the local context the types make sense to regional planning processes and provide relevant information to those familiar with thinking in terms of a simplified set of abstract variables.

Summary:

The paper explores the possibility of creating a meta-typology for rice-farming households in Asia based on case studies in four countries for which separate household typologies had been developed. The analysis applies the livelivestystems approach and impredicative loop analysis in order to scale up local-level household information for higher-level design of adaptation options and policy interventions.

Results visualise the transformation of resources as farming households adapt to changing environments. It shows that farmers require either specific interventions attuned to their resource base or strong policy support as they

entirely shift their livelihood strategies. The method of analysis applied shows that abstract typologies developed from empirical data can serve as powerful tools at the science-policy interface.