ABSTRACT

Agricultural research in marginal dry areas can contribute to reducing poverty through the development of technological, institutional and policy options for poor farmers. Such research should address diversified opportunities and development pathways. This article analyses the diversity of livelihood strategies of rural people living in the Khanasser Valley in northwestern Syria, an area that is typical of marginal drylands. It proposes an operational classification of households based on their different livelihood strategies, applying an integrated methodology within a Sustainable Livelihoods framework. Households are classified into three clusters: agriculturists, labourers and pastoralists. The article examines the diversity of livelihoods involved, and considers where and how research should be directed to have greatest impact on poverty. Given that rural households are not homogeneous but dynamic entities, with diverse assets, capabilities and opportunities, the definition of household typologies can help to target development research. The article concludes that while agriculturists benefit most, poor labourers with enough land can also gain from pro-poor agricultural research. The poorest households with little land, and pastoralists, benefit little or only indirectly.

INTRODUCTION

People living in marginal dry areas have to contend with a fragile environment and unfavourable socio-economic conditions (TAC, 1999). Private investments have traditionally concentrated on the higher rainfall and irrigated areas, while research, extension, market development, credit provision and social infrastructure have often been neglected in marginal areas (Chaherli et al., 1997). Consequently, there is a shortage of improved agricultural technologies that could increase and stabilize the productivity of crop and livestock systems and improve farm incomes in these areas. Whilst agricultural research is generally believed to contribute to poverty...
alleviation in several ways, including the development of technological solutions for poor farmers (TAC, 2001), this depends on many factors, and some question whether agricultural research can actually lead to a significant reduction of poverty (see for example Campbell et al., 2001). There is increasing agreement that research for development should address more diverse opportunities for rural people. This has contributed to a growing focus on the household, to the understanding of household strategies, discriminating between different types of households (Campbell et al., 2001), and identifying opportunities to lift people out of poverty (UNDP, 2002).

The objective of the study presented here was to analyse the livelihoods of people living in the Khanasser valley, a dry marginal area in northwestern Syria which is characterized by widespread poverty, environmental, social and market marginalization. There were two main questions underlying the study: who are the rural poor in marginal dry areas?; and how can rural household characterization help in better targeting research to the poor? The first question requires an examination of the diversity and interdependence of household livelihoods in dry areas. We propose an operational classification to help assess the relationships between different groups of people and the natural resources they manage and, to different extents, depend upon; the relative contribution of different livelihood sources; and the major challenges and threats of disadvantaged poorer groups. The second question looks at the consequences for research of recognizing this livelihood diversity, and deciding where research must be directed in order to alleviate poverty. The analysis is used to introduce pathways to target feasible and sustainable agricultural options generated with and for farmers in dry marginal areas. The local dynamics of livelihood challenges and opportunities, the pathways out of poverty, and the policy implications of the findings for similar marginal areas, are beyond the scope of this article, but will be the focus of a forthcoming follow-up paper.

To discuss these questions in relation to investments in agricultural research, it was also important to quantify the role of agriculture in marginal dry areas in the context of poverty alleviation. We therefore examined the changing role of agriculture in sustaining livelihoods in relation to the increasing relevance of non-farming employment opportunities and migration, the local determinants of rural poverty, and the conditions for diversification in which agriculture can provide effective pathways to escape poverty.

CHARACTERIZATION OF KHANASSER VALLEY AND THE INTEGRATED RESEARCH SITE

The Khanasser study area is situated about 80 km southeast of Aleppo in northwestern Syria, between mountain plateaus in the west and east, a salt
lake in the north and the rangeland (steppe) in the southeast. The area is considered a benchmark site for addressing problems typical of marginal dry areas. The Khanasser Valley Integrated Research Site project developed locally-specific technologies and an approach which can be used to assess and replicate resource management options to marginal areas in West Asia and North Africa with similar natural resources, institutions and livelihoods. The area, extending over 450 km$^2$, lies at the border between rainfed crop lands (with 200–250 mm annual rainfall) and steppe (with less than 200 mm). The two major agro-ecological farming systems are *dryland mixed systems* where sheep and goats interact with cropping and fodder systems, and the *pastoral system*, in which animals graze seasonally and are moved according to the availability of pastures. There is a resident population of about 27,000 (Aw-Hassan et al., 2003), of which some 67 per cent reside permanently in the valley where the population density is 93 persons/km$^2$. In the last two decades, 40 per cent of households, or 27 per cent of people, have migrated permanently to large cities or abroad in search of jobs. This includes the young and small-sized households that have experienced difficulties finding local opportunities for sustainable livelihoods, as well as large households, from which most male migrants originate.

### The Changing Ecological, Institutional and Social Setting

Ecological conditions in the areas are dominated by low and unreliable rainfall; resource degradation through soil fertility loss, salinization, groundwater depletion and destruction of natural vegetation; and loss of biodiversity (ESCWA/FAO, 1996; La Rovere et al., 2003; UNDP, 2002). Water scarcity is a particular constraint: the water which is pumped from government and private wells, and a few functioning ancient Roman wells (*qanat*), is managed by women for watering the animals, or by men for irrigation. Water management issues include over-pumping and inefficient water use.

Since the late 1950s, post-independence reform programmes have expropriated and redistributed land from large landlords to landless peasants. Smaller areas were left communal, increasing land fragmentation and small holdings. The dominant land tenure is private, with redistributed reform land in the north and state lands in the south. The main cultivated crop is barley, followed by wheat. Recently, there has been a transition towards alternative agricultural options such as cumin, a rainfed cash crop that has, to a certain extent, filled a land use and livelihood source vacuum left by cotton; and olives, an increasingly important tree found in both the valleys

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1. Cotton is an irrigated cash crop which is unsustainable in water-scarce areas; in Syria, it was banned in dry areas in 1999.
and the foot slopes of the mountains, that provide oil which is mainly consumed locally.

Degradation of natural resources, particularly rangeland pastures, contributed to the establishment of policies aimed at counteracting these adverse environmental effects. In the mid-1990s, irrigation was banned in the arable zone, conservation areas were established, and cultivation was banned from the steppe, with the result that the frontier between cultivated land and the steppe moved southwards towards drier desert areas. These policies have — often deliberately — contributed to altering livelihoods by inducing a shift of sedentary and semi-sedentary systems towards areas previously occupied by migratory systems. At the same time, cropping intensified, and mechanization increased, resulting in further land degradation.

The area has also seen other important livelihood trends, including an increased role for off-farm labour migration, intensive lamb fattening, and other diversified livelihood strategies which are less dependent on local resources. Lamb fattening differs from traditional extensive sheep herding as it does not use local feed resources, but depends on purchased inputs; it is capital intensive, and can be practised by landless farmers, provided they have enough cash to enter the business. Wage labour activities central to the local economy include herding, crops and crop residue work, waged public employment, construction and other farming and non-farming business in cities and abroad. Sharecropping represents an important labour contract: sharecroppers seasonally rent land, holding the rights over an agreed proportion of the harvest. As this takes place in irrigated areas outside Khanasser it implies the dislocation of families, transaction costs, and emigration.

POVERTY IN MARGINAL DRY AREAS

There are different views on the meaning and extent of rural poverty in marginal areas, its local determinants, and the effectiveness of agriculture-based solutions. There is a tendency to associate poverty with the landless, with unsettled pastoralists, or with female-headed households (World Bank, 2002). A wide range of factors are seen as determinants of poverty, including: a lack of resilience and lack of access to income-earning opportunities; policy biases toward cities at the expense of rural areas; lack of services and infrastructure (IFAD, 2001); population pressure; climatic shocks; the marginalization of women; adverse trade effects; institutional failure to facilitate rural people’s access to the skills, education, and health needed for escaping poverty; lack of freedom, knowledge, and women’s empowerment (UNDP, 2002). Most revealing are the views of local people themselves: in the Khanasser area, an earlier study found that 13 per cent of households were defined by local leaders as ‘very poor’ and 48 per cent as ‘poor’
(Aw-Hassan et al., 2003), and that they themselves relate being poor with having few or no sheep and land, having non-working members, or debts and chronic cash shortage. Those who lift themselves out of poverty in dry areas normally have higher education levels, more livestock, substantial cash production, and remittances. Responses to poverty in marginal areas include privatization, specialization, intensification of farming (cf. Campbell et al., 2001), diversification of activities, migration for wages, and exiting from farming (Dixon et al., 2001).

The complex nature of poverty has driven a change in the mind-set of development thinkers who now increasingly recognize that tackling rural poverty requires initiatives that go beyond the purely economic domain and rural context, and demands the creation of targeted opportunities. Research for development has not always effectively or explicitly addressed and targeted the poor, while increased agricultural productivity has often benefited the poor differently than the non-poor (Hazell, 1999). Some believe that agriculture-led growth can lead to rural poverty reduction by triggering non-farm income generating activities (World Bank, 2002). Others argue for long-term trickle-down effects, as technology change and productivity growth stimulate development of the rural economy and indirectly contribute to poverty alleviation, for example through lower food prices (Alwang and Siegel, 2003) — although there are concerns that most benefits accrue to better-endowed farmers.

RESEARCH APPROACH

The methodology used in the research blended quantitative and qualitative methods and allowed integration of data and knowledge at different levels of analysis. It included a series of steps, which are depicted in Figure 1.

The first step consisted of a Rapid Rural Appraisal (RRA) as a baseline, interviewing key informants at each of the fifty-eight local villages in order to group comparable villages into classes with a high degree of internal homogeneity. Cluster analysis was developed to group variables commonly used to define the dominant livelihood strategies shared by the inhabitants of the villages. These were used for the similarity measure. This also quantified ecological (water availability, access and quality; land use, suitability, degradation, elevation) and socio-economic (community assets and activities, marketing constraints, labour, demography) village variables, that were afterwards mapped and overlaid with Geographical Information Systems in order to identify five representative villages (Aw-Hassan et al., 2003).

In the second step, a range of participatory and other methods were used in order to understand the external factors that affect rural livelihoods, refine the research questions, and target the ensuing questionnaire. These methods included timeline analysis, seasonal calendars, analysis of trends in
communities’ history, resources, and strategies of their inhabitants, policy analysis (La Rovere et al., 2003), and a multi-annual market analysis (La Rovere and Aw-Hassan, 2005).

In the third step, the Sustainable Livelihoods framework (Campbell et al., 2001; DFID, 2000; Ellis, 2000) was employed to classify households into representative typologies. Households were preliminarily classified by means of rapid interviews that divided all households in the representative villages into homogeneous clusters, based on whether or not they shared similar productive activities and livelihood strategies. Subsequently, the ‘membership’ of households in the hypothesized livelihood groups was verified with wealth ranking and other participatory tools.

In the next stage, eighty in-depth, semi-purposive, random sample individual interviews were conducted with the household heads within the pre-identified clusters, to include each of the typologies in proportion to the number of households living in each of the representative villages. This semi-purposive approach reduced the risk of missing households that migrate or that are part of extended families, and ultimately allowed for a confident definition of household typologies and the various capitals available to local people. These capitals comprise: (1) physical and natural: the land used for crops, including its fertility, the available pastures, water, farm equipment, animals tended and, in general, the natural resources used;
(2) financial: sources and amount of cash, and use of micro-financing and borrowing; (3) social and human: education levels, labour opportunities and migration patterns, and the social fabric constituted by organizations and associations.

Based on farmers’ self-perceptions, as gathered by the RRA focus group interviews, and on the survey of the key household informants, a livelihood source was considered to be the main source if it contributed at least 75 per cent of total household income. Preference and matrix ranking by focus group interviews gathered additional data on elements of household economics, assets, access to services, etc., that form the basis of livelihood resilience and of strategies that households employ to manage risk and variability. Long-term dynamics and driving forces were captured by components of the survey aimed at assessing trends in resource use and perceptions of ecological changes over long time spans.

Relative poverty in terms of income inequality across the household typologies was estimated by calculating the Lorenz curve of income distribution and the Gini coefficient (World Bank, 2004). This number represents the degree of inequality across a rural population; it varies between 0 (reflecting complete equality) and 1 (reflecting complete inequality). Spreadsheet modelling employed survey data to simulate scenarios relating to the impact of possible extremes in production and in the economic and marketing conditions that could be encountered by the different household typologies. Scenarios consisted of potential impacts of variability in crop and animal production, off-farm labour availability, crop yield fluctuation due to rainfall variability, and marketing instability on incomes and livelihoods, by exploring combinations of lower or higher yields and prices.

RESULTS

Based on their diverse forms of productive and social capital, livelihood strategies, and income structure (DFID, 2000), local households were categorized into three major types: agriculturists who are involved in on-farm crop production, lamb fattening and waged labour; labourers who are semi-landless and mostly rely on off-farm earnings and migration; pastoralists who are extensive herders, migrate for wages, or engage in lamb fattening.

Agriculturists and pastoralists were sub-divided based on whether they had significant off-farm labour (‘agriculturist–labourers’, ‘pastoralist–labourers’) or not (‘pure agriculturists,’ ‘pure pastoralists’). The labourers were sub-divided according to their secondary livelihood source (wages being the primary source) — cropping (‘labourer–farmers’) or herding (‘labourer–herders’).
The main characteristics of the household types and their sub-typologies identified in the Khanasser area, and distinguished in terms of the different types of capital, are given in Table 1.

In terms of physical and natural indicators, the pastoralists own the largest herds, the agriculturists own most lamb-fattening enterprises and have the largest landholdings, irrigated areas, and per capita land ownership ratios, while the labourer–farmers can count on significant arable land. The labourer–herders are the least endowed in land, animals and access to water. The pastoralists have customary access to land situated in the rangeland zone or on low productivity sloping areas, which they do not own or cultivate but mainly use for grazing their flocks. The fact that some groups with higher initial resource endowments have diversified their activities (for example, agriculturists into fattening, pastoralists into waged labour) suggests that livelihood diversification is conducive to increased wealth and reduced vulnerability, while strategies that substitute among assets support livelihood resilience. The average figures on owned fattened sheep are skewed, since the size of intensive flocks depends on the herder’s economic resources and the financial support from external investors.

In terms of economic and financial indicators, the wealthiest groups are the agriculturists and the pastoralist–labourers (>US$ 1.30 per day). If we look in detail at the communities situated in arable areas, those in which agriculturist–labourer households are the majority have livelihoods based on lamb fattening and cropping; they have average per capita incomes of US$ 1.29 per day. Those dominated by labourer–farmers and agriculturist–labourers, with livelihoods based on a mix of cropping, herding and off-farm labour, have average per capita incomes just above US$ 1 per day. The income-poorest communities are those dominated by labourers (US$ 0.86 per day average per capita income), and those based in the rangeland (US$ 0.82 per day average per capita income) who are mostly labourer–herders and pastoralists. Their livelihood strategies are based on extensive sheep production and seasonal migration for grazing and labour.

In terms of social indicators, the household typologies differ in various respects. The agriculturist–labourers and pastoralists have the largest families, while the pure agriculturists have the smallest families. Seasonal migration outside the study region is practised by 75 per cent of the labourers’ households, 66 per cent of the agriculturist–labourers, and nearly 50 per cent of the pastoralist–labourers’ households. The share of people who completed intermediate schooling is lowest for the pastoralists, and lower for females than for males. This gender disparity among pastoralists is

2. The ‘pure’ agriculturists appear wealthier than the agriculturist–labourers due to their relatively smaller family size, so that fewer members share the family income.
### Table 1. Household Typologies, Assets and Capitals in Khanasser

<table>
<thead>
<tr>
<th>Type of Capital</th>
<th>Labourers</th>
<th>Agriculturists</th>
<th>Pastoralists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social, human</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>People</td>
<td>9.17</td>
<td>6.64</td>
<td>6.75</td>
</tr>
<tr>
<td>Educated males</td>
<td>68%</td>
<td>66%</td>
<td>88%</td>
</tr>
<tr>
<td>Educated females</td>
<td>46%</td>
<td>28%</td>
<td>11%</td>
</tr>
<tr>
<td>Members of associations</td>
<td>25%</td>
<td>9%</td>
<td>50%</td>
</tr>
<tr>
<td>Migrant members</td>
<td>75%</td>
<td>73%</td>
<td>0%</td>
</tr>
<tr>
<td>Land owned or occupied</td>
<td>Total ha</td>
<td>6.83</td>
<td>3.73</td>
</tr>
<tr>
<td></td>
<td>Irrigated</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>ha/capita</td>
<td>0.75</td>
<td>0.56</td>
</tr>
<tr>
<td>Natural, physical</td>
<td>Water:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- well owners</td>
<td>58%</td>
<td>9%</td>
<td>25%</td>
</tr>
<tr>
<td>- water buyers</td>
<td>92%</td>
<td>27%</td>
<td>100%</td>
</tr>
<tr>
<td>Sheep:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- extensive Heads</td>
<td>4.17</td>
<td>3.73</td>
<td>21.75</td>
</tr>
<tr>
<td>- fattened (lambs)</td>
<td>0%</td>
<td>0%</td>
<td>70.0%</td>
</tr>
<tr>
<td>Financial</td>
<td>Average credit use $/year/household</td>
<td>490</td>
<td>310</td>
</tr>
<tr>
<td></td>
<td>Ratio over turnover % of total</td>
<td>18</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Per capita income US$/daya</td>
<td>0.82</td>
<td>0.48</td>
</tr>
<tr>
<td>‘Main Livelihood activities’</td>
<td>Cropping</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Livestock</td>
<td>7</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Lamb fattening</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Off-farm wages</td>
<td>84</td>
<td>76</td>
</tr>
</tbody>
</table>

**Note:**
(a) Based on an exchange rate of 51 Syrian Pounds/US$ 1 in 2002.

**Source:** Authors’ fieldwork
greater than the national average for adult illiteracy which stands at 12.3 per cent for males, and 40.7 per cent for females (UNDP, 2002). The low education rates for pastoralist households is perhaps not surprising, as the opportunity to attend schools is often related to migration to cities.

In terms of belonging to organizations and networks for sharing formal social capital, the pastoralists are the most likely to be members of co-operatives that facilitate their access to feedstuffs. Few of the labourers’ households are members of agricultural associations. The exclusion of the landless from membership of rural co-operatives also means that they cannot benefit from many rural services, such as credit to purchase inputs, which are offered by co-operatives or rural banks.

The calculated aggregate annual economic turnover generated by people in the study area, including remittances and waged earnings, is estimated at about 0.5 billion Syrian Pounds (SP), equivalent to US$ 10 million. The labourers’ households (constituting roughly 50 per cent of the total population) own or manage less than one-third of the land and generate only one-third of the total annual economic turnover, mostly in off-farm earnings from outside the area and partially from outside agriculture. In contrast, the agriculturists (39 per cent of the total population), own or manage 42 per cent of the land and generate 53 per cent of the annual economic turnover, largely generated within the area by the productive use of local natural resources, and through lamb fattening using concentrated feeds imported from other areas of Syria or from abroad. The share of the economic turnover generated by the pastoralists reflects the fact that the boundary of the study area was drawn to include the transition rangeland zone between the cultivated area and the steppe. Table 2 shows that pastoralists’ average per capita economic turnover over the population is similar to that of the agriculturists. They are thus in a more economically favourable position than the labourers.

Relative inequality is represented in Figure 2 by the Lorenz curve of income distribution across heterogeneous segments of the population, based on household livelihood typologies. The various household typologies are plotted according to their increasing levels of income per capita. The inequality within the population is represented by the calculated 0.217 cumulative Gini coefficient across the whole rural population. This value

<table>
<thead>
<tr>
<th></th>
<th>Labourers</th>
<th>Agriculturists</th>
<th>Pastoralists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share of population over total</td>
<td>50%</td>
<td>39%</td>
<td>11%</td>
</tr>
<tr>
<td>Share of land over total</td>
<td>29%</td>
<td>42%</td>
<td>33%</td>
</tr>
<tr>
<td>Share of economic turnover over total</td>
<td>33%</td>
<td>53%</td>
<td>14%</td>
</tr>
</tbody>
</table>

Source: Authors’ fieldwork
suggests relatively low inequality within rural areas. Graphically, the Gini coefficient can be represented by the ratio of the area under the Lorenz curve over the area under the straight diagonal line representing equality in a Lorenz graph. Since productive sectors such as industry are virtually absent from the area, this only reflects the inequality within the agricultural sector and does not include considerations of inequality between rural and urban areas.

Livelihood Challenges and Opportunities

In dry areas such as Khanasser, livelihoods are driven by powerful socio-economic and ecological forces (La Rovere et al., 2003; La Rovere and Aw-Hassan, 2005). These include such factors as: (1) drought, groundwater depletion and water shortages, leading to declining crop productivity, poor household sanitation and higher expenditure to buy and transport good quality water; (2) rangeland degradation, which contributes to a reduction in food availability for the pastoralists and for those living in areas bordering the rangeland, affecting flock sizes, and setting off a chain of social impacts such as migration; (3) declining soil fertility, often due to unsustainable uses of land and natural resources, which impacts on the environment and affects farm productivity.
The major issues in terms of economic and financial capital are decreased real per capita incomes linked to growing families, and lack of cash and erosion of monetary and physical savings due to higher living and farming costs. Rural households are increasingly seeking credit to help overcome liquidity problems and to meet their mounting living costs, although this is not matched by sufficient availability of credit at accessible interest rates. Household earnings are first spent to cover health costs and recurrent living costs. Only when these are met do households invest in farming: the agriculturists primarily rent equipment, buy seeds or fertilizer, or hire labourers; the pastoralists rent trucks to transport animals and feed, buy water and farming implements, and hire labourers. The net disposable income left after meeting health and living costs — calculated as monetarized in-kind payments to factors of production, and confirmed based on the estimated per capita consumption expenditure for Syria of US$ 1.32 per day (FAO, 2003) — is limited and appears to allow a surplus only for the agriculturists and pastoralist–labourers. Hence, credit and informal borrowings are crucial. The annual average household borrowing (see Table 1) is a proxy for household needs to meet cash shortages. Credit, particularly informal borrowing, is mainly used to cover family and health costs that cannot normally be met by savings or are not covered by social networks.

In terms of social and human capital, the driving factors include population growth, declining employment opportunities in rural areas, land fragmentation (cultivated land per capita in Syria has dropped from 0.94 ha to 0.36 ha since 1970; see UNDP, 2002), migration, increasing living costs, and declining per capita incomes. The mechanization of farming and limited diffusion of labour-intensive crops also have a negative effect on opportunities in local agriculture. As a consequence of population growth, there is an increasing tendency for men to seek work in cities, and a concomitant feminization of agricultural labour (Abdelali-Martini et al., 2003). Female employment, both in on-farm and contracted agriculture (olive and cumin harvest, collection of wild products, livestock husbandry), and their decision-making influence within the family and society, have increased, although their access to production factors remains severely limited.

Despite significant government investments in Syrian marginal areas, local people still feel that improvements are needed in the quality and availability of education and schooling, rural extension services, quality of and access to health services and sanitation, coverage of electricity and telephone networks, and infrastructure supporting the transport of people and goods to and from the commodity and labour markets. Nutritional standards, especially those of children (Ghosh et al., 2004), and the

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3. This is despite the fact that their current ratio of borrowings over income is already substantial, at around 25 per cent. The agriculturist–labourers are the exception here, with a ratio of less than 10 per cent. See Table 1.
availability of nutritious and diversified food are also lower in the more marginal areas. This should be a priority topic for policy research.

Livelihoods Strategies

Many factors influence the structure of resource endowment in rural communities in marginal areas. Among these is access to social capital that enables individual households to claim resources such as credit or co-investment. Many farmers who developed lamb-fattening enterprises use co-investment arrangements with investors from outside the valley. The development and sustainability of such complex arrangements require entrepreneurial skills. Social networking is also useful in the search for non-farm jobs and migration routes, and in developing trust with traders that connect small producers (such as dairy sheep farmers) to the market. Combined capabilities and assets of this kind form a pathway out of poverty and enable households to diversify their livelihood sources and mitigate vulnerability. This process of diversification, as a consequence of farming in marginal areas where opportunities and options are scarce, is driven by households’ dynamic response to the uncertainty of their social and ecological situation.

The agriculturists integrate on-farm crop and animal production from which they obtain most of their income (see Figure 3). Up to half of this is from fattening, yet very few are purely lamb fatteners. Their livelihoods have been evolving as the traditional extensive crop/livestock mixed system was expanded to include lamb fattening, new field crops and migrant remittances. The agriculturist–labourers have income from off-farm wages,
either within Syrian agriculture, or abroad. They also have the second-largest families and land ownership ratios (more than 1 ha/capita). The pure agriculturists tend to have families which are not (yet) large enough to enable them to work off-farm. They have fewer working members and a lower wage-earning ability; they often cannot fully exploit their farming potential and are net labour importers. Yet, they have the highest land ratio (1.12 ha/capita) and earnings from crop sales. They believe that enhancing their livelihoods depends on aspects such as water availability (for both drinking and irrigation), access to micro-financing, alternative income-generating opportunities, and a wider presence of services including education, health and transport.

The labourers earn most of their income from various forms of off-farm activities (Figure 3), locally, nationally and internationally, both in and outside agriculture. Many of them are sharecroppers. While the labourer–farmers have some earnings from the sale of their crop surplus, the labourer–herders have limited assets per household in terms of animal rearing (less than four sheep) and land (less than 4 ha). Their flock size has drastically decreased in the last two decades due to depletion of grazing resources and as a result of selling sheep to pay for increasing living costs. These households were also affected by cash shortages and expenditure necessary to provide the basic services to their growing families. They have the highest per capita incomes from migration (their main and often sole source of liquidity for survival), yet most still rely on credit and borrowing to pay for living necessities and farming investments. They may be facing a risky future as they rely on activities subject to variability, such as crops and waged labour demand. One of their main concerns is drinking water quality, with repercussions on expenditure and health. Other aspects which they perceived necessary to enhance their conditions include the local creation of jobs, health care, education and a developed infrastructure to facilitate transport.

The pastoralists’ livelihoods are dominated by extensive herding (Figure 3). Their land is communal with no formal property rights, although traditional user rights are still applied. They have large families and high costs for purchasing food and water, and for transporting their animals. They have the largest flocks — mostly of an extensive type — and rarely engage in intensive lamb fattening. Together with the labourer–herders and the landless or land-scarce households in general, they are the main users of credit (nearly 30 per cent over total household turnover). Pastoralists differ in terms of the extent, dynamics and patterns of their off-farm labour migration (La Rovere et al., 2003), as well as in the ownership of trucks to transport people, animals and feed. The pastoralist–labourers have been diversifying their strategies by including off-farm work. In the rangeland, the relatively less developed transport network hampers the seasonal movement of flocks, marketing of animal products and feed and diversity of nutrition, and imposes high transaction costs for those not owning a truck.
Drought and lack of drinking water are the main and most costly problems for pastoralists and for their flocks. Lack of cash and difficult access to credit hamper investments, while jobs in the steppe are virtually non-existent. Forage scarcity makes them dependent on purchased feedstuffs, which, in turn, are not always accessible to many due to the weakened role of feed-delivery co-operatives. This group feels that education could enhance their options by increasing skills, knowledge and opportunities and subsequently their assets and wealth.

**Role and Variability of Livelihoods Portfolios**

Marginal dry farming systems are characterized by highly variable and vulnerable animal and crop enterprises and the demand for off-farm labour. Variability is due to trends in population, resources, climate, economic shocks and seasonality of prices, production and labour markets (cf. La Rovere and Aw-Hassan., 2005). Although crop production is most obviously affected, animal production is also hit by drought and trade shocks. In this section we describe and quantify the changing roles played by these activities within livelihood portfolios. Within the study group, livestock production is the major source of income (48 per cent), followed by off-farm wages (42 per cent), with crop production only third in terms of the direct income it generates.

**Animal Production**

The main income source from livestock varies between household types: for the agriculturists it is lamb fattening, for the pastoralists, herding. The average share of dairy income over total household income is marginal for the agriculturists (2–3 per cent), somewhat more significant for pastoralists (11 per cent); it varies greatly depending on whether the sales occur in or off season. Periodic or seasonal changes in the herd size are normal events in local farming systems, but the average decline experienced during the last two decades is significant (La Rovere et al., 2003). This was due to drought, higher cost of feed, lower effectiveness of feed-delivering co-operatives, animals being sold to finance family expenses, and a policy banning cultivation from rangelands, which reduced the availability of barley and crop residues. However, the dwindling size of extensive herds is being compensated by their gradual substitution by market-oriented fattened lambs.

**Off-farm Labour**

As off-farm, non-rural opportunities in marginal areas are limited, young men and families migrate to the olive and cotton growing and irrigated areas of northeastern Syria, to cities or abroad. While the capacity of Syrian
cities to absorb this job demand is declining (with the notable exception of the burgeoning construction sector, in turn fuelled by immigration from rural areas), migration to foreign countries such as Lebanon, Jordan and Saudi Arabia is sustained, driven by attractive wages for unskilled jobs that cannot be filled domestically. More than half (56 per cent) of all off-farm earnings originate from overseas migration, 29 per cent from national agricultural work and 15 per cent from national non-agricultural work (see Figure 4).

Earnings from working in agriculture (52 per cent) nearly equal those outside it (48 per cent); migrants within Syria predominantly work in agriculture, those overseas outside agriculture. The demand and supply of off-farm labour have changed greatly. Labour availability has increased, fuelled by growing families, and can be absorbed locally by only a few agricultural enterprises, such as cumin and lamb fattening, that are more labour-intensive than the traditional crop–livestock system. Local winter unemployment is balanced by springtime labour shortages.

**Cropping**

The variability of earnings from crop production is due to climatic conditions, yields, marketed or consumed production, and market prices. Over all household types, the total income from crop production, including the value

*Figure 4. Labour Earnings Pyramid: Shares of Waged Earnings by Labour Source*
of home consumption of wheat and the feed value of barley, wheat and other residues, stored surplus, and sales, amounts to 20–25 per cent of total income, with large variability across households. What is actually sold provides an average of 5–10 per cent of the labourers’ and agriculturist–labourers’ income, and an average of 23 per cent of the pure agriculturists’ income. By means of a model, this was simulated to fluctuate from as little as 2 per cent of total income of the labourer–herders under conditions dominated by low prices and yields, to as much as 44 per cent of total income of the pure agriculturists with good prices and yields. The direct earnings from crop sales — about 10 per cent of total income — are thus not the main direct contributors to rural incomes. Similarly, wages of local labourers in local agriculture make up just 7 per cent of total off-farm labour earnings (Figure 4).

The direct relevance of cropping for livelihoods in marginal areas such as Khanasser is low relative to other livelihood sources, with implications for those who depend most on cropping. Yet the full significance of crops for livelihoods and farming systems is greater than the pure economic value of the sold crop, since crop outputs are essential for consumption as feed and as sources of recycled soil nutrients.

DISCUSSION

In the Khanasser area the poorest households are the landless and those with livelihoods mostly based on migration and off-farm wages. Earnings from migration, although a vital source of income, are often insufficient to allow these households to emerge from poverty. The pastoralists, with livelihoods mostly based on extensive herding in more remote steppe areas where off-farm work opportunities are virtually absent, are also among the poorest. Most per capita disposable incomes in the area were found to be below US$ 2 per day, while for labourers (half of all households) it was below the widely accepted US$ 1 per day indicator of dire income poverty. There is considerable diversity at the village level: while some communities fall notably below US$ 1 per day, others are well above it, depending on the livelihood groups to which the majority of households belong. Yet the ‘$/day’ threshold is only one indicator of poverty. What is locally crucial and often critical is people’s vulnerability to fluctuations — in climate and production, crop sales, earnings from animals, and the seasonality of labour opportunities. Crop variability and the levels of risk in livestock production and job markets have been shown to be high in these and similar marginal areas (TAC, 1999).

The most frequent responses of local households to the challenges of living and farming in marginal areas are diversification of livelihood strategies, specialization (for instance in lamb fattening or off-farm labour), out-migration and, in many cases, exiting agriculture altogether. Diversification
can contribute to increased wealth and improved food intake; it can enhance employment opportunities, reduce vulnerability, and increase the resilience of rural farms based on flexible and differential responses to changing opportunities, and on farmers’ innovation. It can also improve natural resources by facilitating the adoption of improved technologies, capitalizing on crop associations, integrating crops, livestock and trees, improving input-use efficiency, and preserving biodiversity (Barghouti et al., 2004). Successful households are often those that can more quickly adjust to market opportunities, diversify horizontally (into different crops) and vertically (into different value added activities). Leaving full-time agriculture is a more extreme option, for farmers who cannot diversify and can no longer compete independently. This more often applies to the poorer, landless and more remotely-located people of marginal areas for whom there are no obvious farming-based opportunities.

However, diversification alone cannot lift people out of poverty (Campbell et al., 2001). Improving the options of the poorest first requires effective, realistic, flexible and accessible micro-financing schemes that can overcome the liquidity gap and provide a start-up investment in specialization and diversification, and that are targeted to those in actual need. Rural credit is a prerequisite for initiating and adopting technologies to enhance economic participation and set up small businesses (Campbell et al., 2001; UNDP, 2002); they are a priority for households with no large off-farm earnings, or high farming costs. Yet formal credit is available mostly to those who are already better-off, or to large enterprises, or else it is tied to land ownership. The asymmetric targeting of credit, the need to ensure that lending has built-in flexibility and to build capacity for efficient delivery, must be explicitly addressed in designing credit schemes that benefit the poor and are well managed.

Agricultural research and other institutions should promote diversification by identifying alternative opportunities and helping farmers to access them, and by improving the abilities of small farmers to produce what they can sell at prices favourable to them (cf. Barghouti et al., 2004). Findings from this study show that some two-thirds of the population can be counted as beneficiaries of agricultural research in the Khanasser area. This figure excludes from the direct beneficiaries the virtually landless labourers and most pastoralists. Broad-based growth stimulated by agricultural research, however, has indirect spillovers for the excluded groups such as increasing labour demand from technology-induced productivity growth, labour-absorbing value-added technologies, and declining input prices.

There are three sectors of rural population on which research impacts in different ways and to different extents. The households which can benefit most from agricultural research — directly by adopting agricultural technologies, and indirectly through its positive spillovers — are the relatively better-off (though still essentially poor) agriculturists, who are endowed with market-enabling assets (access to water, land per capita, lamb-fattening
facilities), as well as larger numbers of wage-earning family members and higher education levels. These households are best able to combine capabilities and assets to lift themselves out of poverty. In the Khanasser area, this includes about 45 per cent of all households.

In contrast, the poorest and virtually landless groups, the labourer–herders and pastoralists, have the lowest income per capita and per household, and insufficient assets. These households — about 30 per cent of the total — may be reached indirectly by the spillovers of agricultural research, but are unlikely to gain directly from agricultural research. They may benefit only from longer-term investments by government and development institutions that create enabling social, health, financial and infrastructure conditions. These households are the most likely to exit farming. Although unable to directly alleviate their state of poverty, agricultural research centres are well placed to identify and advocate alternative policy intervention pathways.

In between these two sub-sectors of local rural society are those who are poor, but with sufficient productive assets to make use of agricultural research solutions, and to find direct and indirect opportunities within rural areas without having to leave farming. In the study area these constitute a sizeable 25 per cent of all households. It is towards these latter households that agricultural research can and should be targeted more effectively.

Interventions aimed at changing the livelihoods of poor farmers are likely to include, at least initially, the acquisition and integration on-farm of market-oriented fattened lambs. These may be marketed at convenient times and places to diversify production and market risks in space and time, and represent a strategy to escape poverty and gradually build up capital assets. In addition, there seem to be partially unexploited production niches for processing and commercialization of dairy products in the area. Incomes from dairy sales are low compared to the role that dairy production plays for consumption and subsistence. Targeting the small, labour-intensive, capital-light dairy processing chains to women and female-headed households can be effective, if backed by appropriate micro-credit. Most households, especially those in the steppe, could progressively enter or remain competitively within the livestock business, without needing to permanently migrate. It is inevitable that some household members, particularly the young men, will continue to seek seasonal off-farm labour, but this is positive as it facilitates liquidity flow into rural areas. This disposable income is essential for gradually acquiring farming inputs, enabling technology diffusion and adoption, or buying farmland. Access to land, in turn, will require that land rights are clarified and land ownership facilitated by appropriate policies and mechanisms (La Rovere

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4. Pastoralists can, in addition, be reached by targeted research and development that take into consideration their extensive migratory production patterns.
et al., 2003). The development of local institutions and social capital is fundamental to facilitate the bottom-up generation of market-driven cooperatives that help to stabilize input prices and output revenues, particularly at times of drought and economic stagnation. When these conditions are met, improved farming technologies — even if initially adopted mostly by the relatively better-off farmers — can represent options also for the poor.5

CONCLUSIONS AND IMPLICATIONS

This study has shown that rural households are not homogeneous entities and must not be considered as such (cf. TAC, 2001). Their assets, capabilities, resilience and opportunities vary. The definition and operative adoption of household typologies are an important element of development-oriented action research that allows hypotheses, technologies and policies to be tested vis-à-vis the intended beneficiaries and alternative policies to be designed which take account of livelihood diversity and the interdependence of different groups through labour exchanges and mobility. Such typologies can also facilitate the identification, targeting and transfer of research solutions to similar marginal dry areas of Syria and beyond.

The direct clients of agricultural research are the poor groups endowed with enough natural and labour resources to make a living predominantly from agriculture, or the relatively better-off households that can adopt new technologies, but rarely the poorest groups. In the specific case of the Khanasser area, while the agriculturists can benefit directly and indirectly from agricultural research, the poorest households with livelihoods based on remittances and scarce land assets (cf. TAC, 2001) and the marginalized pastoralists, will benefit little or only indirectly through positive employment spillovers in rural labour markets. Choices must therefore be made as to whether and how agricultural research should directly address rural poverty and its multifaceted causes, or whether it should be limited to improving the livelihoods of only some farmers (TAC, 2001). Compromise strategies may be possible if we accept that agricultural research — especially if focused on cropping options in marginal dry areas — tackles only part of the complex problem of rural poverty.

There are a number of other challenges for livelihoods in marginal areas — health, education, unemployment, trade — that also need to be factored in and addressed at the institutional and policy levels, and on which agricultural research can have only modest and highly variable impacts. Investing in skills development and education, for instance, is crucial to give people the chance to access and create non-farm opportunities, as long as

5. La Rovere and Aw-Hassan (2005) build on the characterization of livelihood strategies to discuss specific pathways out of poverty based on agricultural technologies.
it is accompanied by job creation (Campbell et al., 2001). It is important to examine which forms of long-term social investments aimed at reducing poverty in marginal areas will yield higher returns than investments in agriculture and research. Successes in social spheres may enhance rural people’s opportunities for self-advancement by contributing to a next generation of healthier, more skilled, educated and motivated young people, who are likely to be better integrated in market-oriented economies and capable of participating in diversified activities.

Suggesting how to do this is beyond the scope of this article, yet research for developing rural areas must examine these issues and stimulate a critical reconsideration of how best to target poverty. Research organizations often end up working with the better-off, educated, endowed and innovative farmers. This can facilitate the testing and adoption of new technologies, but does not always reach those who are in the greatest need. In such cases, it is likely that growth, driven by the delivery of technological options, will predominantly benefit the larger or better-off farmers and herders, and may actually contribute to creating or widening inequality.

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