

Syrian Arab Republic: Thematic study on participatory rangeland management in the Badia



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Cover photo: Women herders on rangeland, near Shehatyah village, Hama province, Syria.
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Badia Rangelands Development Project

Near East, North Africa and Europe Division
Programme Management Department

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Abbreviations and acronyms

| | |
|--------|---|
| ACSAD | Arab Center for Studies of Arid Zones and Drylands |
| BRDP | Badia Rangelands Development Project |
| FAO | Food and Agriculture Organization of the United Nations |
| FU | fodder unit |
| GUF | General Union of Farmers |
| ha | hectare(s) |
| ICARDA | International Center for Agricultural Research in the Dry Areas |
| SYP | Syrian Pounds |
| UNDP | United Nations Development Programme |

I. Introduction

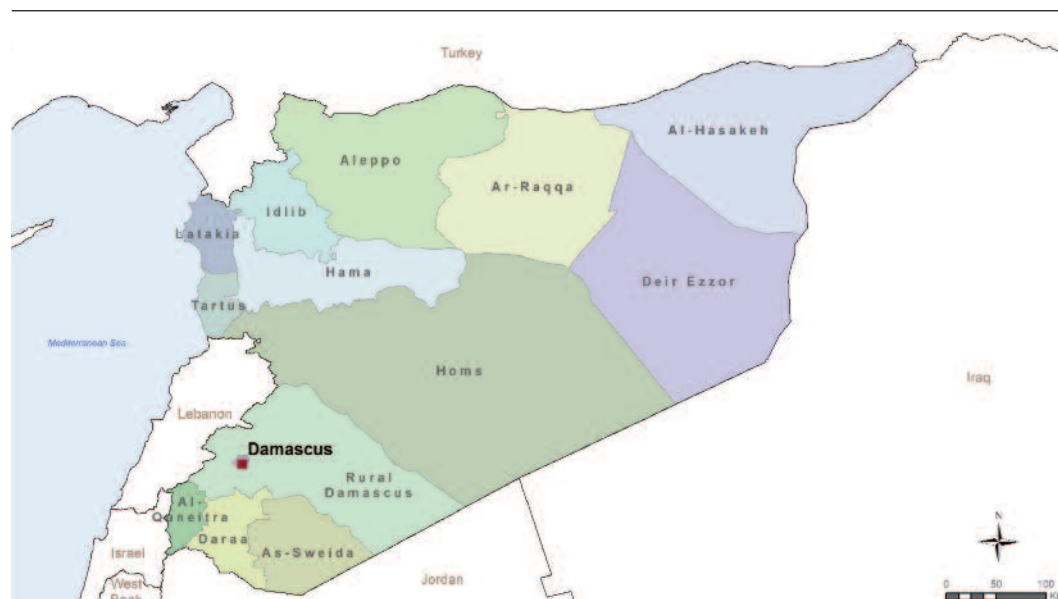
The Syrian Arab Republic, like other countries of the Middle East, North Africa and Central Asia, is a dry country that is prone to drought, with large areas of desert or semi-desert that are too fragile to be cultivated but will support grazing for a restricted number of livestock. These areas of ecological fragility, if overgrazed and poorly managed, can quickly become degraded and desertified and, in the worst case scenario, can eventually become biologically sterile. Good management of these resources is therefore critical to maintaining healthy ecosystems and the livelihoods that depend on them.

Many different factors have put pressure on these lands and upset systems of natural resource management that have been in place for centuries. The pressure of population growth is one of the major contributors to overgrazing, leading in turn to degradation. But conflict, political upheaval and poverty also lead to mismanagement of resources. At the same time, the effects of climate change are adding to the difficulty of maintaining productive and healthy rangelands.

If management and rehabilitation are to be sustainable in the long term they must also be participatory, involving the farmers themselves in the restoration and management of the resources they depend upon. This was the rationale behind the IFAD-supported Badia Rangelands Development Project (BRDP), which ran from 1998 to 2010 and was cofinanced by the Arab Fund for Economic and Social Development. Lessons learned from projects implemented over the past four decades in Syria and many other countries in the region show that top-down decisions involving design and implementation that ignore the role of herders and traditional uses of the natural resources and infrastructure (especially water) do not result in sustainable changes. Too often, at project completion activities close down, and roads and water points are misused and fall into disrepair.

The success of this participatory rangeland development project offers a meaningful set of references at the local, regional and international levels. Its methodology and its achievements in participatory rangeland management are simple and cost-effective to replicate on a large scale under similar conditions.

Figure 1 Map of Syria



II. Historical, policy, institutional and climate change context

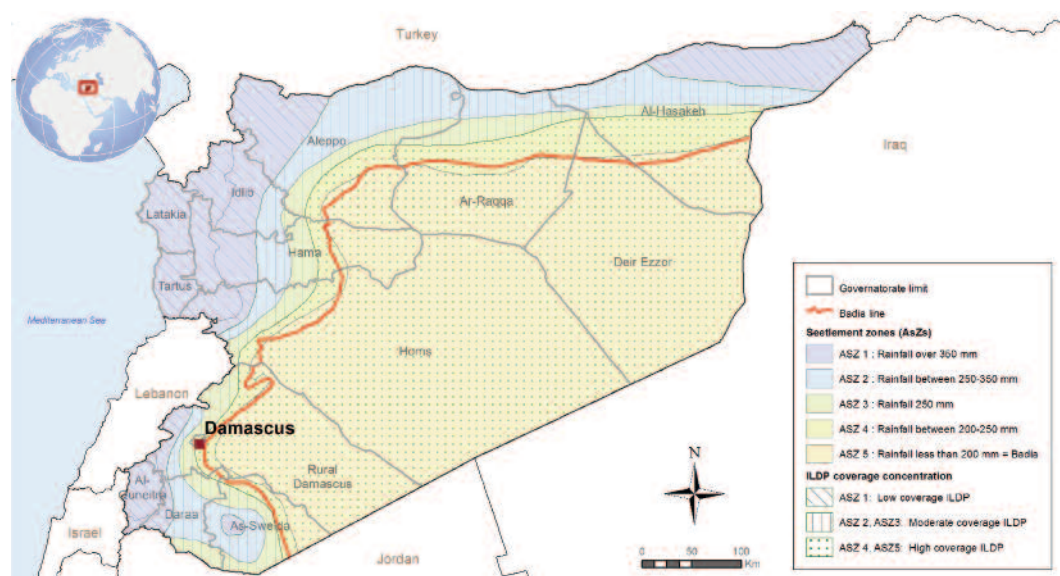
The geography of the Badia

The Syrian Arab Republic is situated in the heart of the Middle East and covers a land area of 185,180 km². In 2009 its population of 21.1 million was growing at an annual rate of 2.5 per cent. Syria has a Mediterranean climate. The country is divided into five agricultural settlement zones based on annual rainfall averages. Zone 1 is the most advantaged and receives over 350 mm/year, while zone 5 receives the lowest rainfall. The greater part of the Syrian steppe, or Badia, is located in zone 5, with some areas falling under zone 4.

The Badia covers 10 million hectares (ha), or 55 per cent of the country's land area, and stretches over large parts of central and eastern Syria. Characterized by poor soils and low rainfall, which decreases from west to east, it is suitable only as grazing land for small ruminants, equines and camels. The Bedouin communities that inhabit the Badia, some partially settled and some still nomadic, herd about 12 million animals within this area, predominantly sheep, but also goats (about 1.6 million) and camels (about 27,000). This dense occupation (or high stocking rate), which is beyond the appropriate carrying capacity, leads to drastic deterioration of the native rangelands and depletes their contribution to extensive animal production systems. It is estimated that in the degraded state, the Badia would contribute only about 12 per cent of the energy requirements of the annual stock (around 8 million sheep at present), or the equivalent of a grazing period of less than two months without supplementation.

The low rainfall average in the Badia rangelands varies from 200 to 50 mm per year and is characterized by significant annual and seasonal fluctuations; any year and any season (with the exception of the summer months of June, July and August) can be dramatically dry or exceptionally wet. The pattern of rainfall distribution is also unpredictable. Rainfall occurs largely in the cold period, from November to May, with maximum precipitation in January. A year may

Figure 2 Agricultural settlement and rainfall distribution zones of Syria



Source: MAAR/GCSAR-2006



©IFAD/Nabil Mahaini

Badia rangeland planted with fodder shrubs

begin with promising rains but the situation can quickly turn catastrophic, with drought during the growing season or the occurrence of hot, dry winds (sirocco) during early spring. Added to this, strong winds, hot temperatures and the impenetrable crust of most soil types are all factors that increase evapo-transpiration and run-off rates.

Mismanagement and abuse of the plant and soil resources within the Badia, particularly in the past five decades, has resulted in severe degradation of plant cover and soil quality. The soils found in the Badia tend to be shallow, rocky and/or dominated by gypsum, poor in organic matter and vulnerable to erosion. Poor vegetation cover exacerbates the problem of erosion. Insufficient water balance in the soils is the result of low rainfall and capped soils. Better soil quality can be found only in depressions and large wadis.

Groundwater management in Syria is an issue of great concern to water policymakers, planners and legislators, regarding not only the quality but also the availability of resources. Syria has significant groundwater resources,¹ but the most important aquifers are concentrated in the western and northern regions and most of these have been overexploited.² The intensive use of groundwater for agriculture over the past decade has endangered the water table and drastically lowered the availability of water from springs. In the Badia, the availability of clean water suitable for human and animal consumption and for rangeland development is an important component of any development initiative. Fetching water is a burdensome task for many Bedouin families, especially those who cannot afford to run motorized water haulage. Earth dams and water ponds are the most efficient means of trapping and holding water from seasonal rainfall and streams, and a number of dams and water harvesting structures have been constructed since 1997.

Government policy and agriculture sector strategy

The Badia is state-owned, but the Bedouin and other livestock owners have customary use of the resources, with more or less mutual recognition of grazing rights for each group. Aside from a few sizeable towns and several villages situated at its edge, this large geographic area is very sparsely populated. The settled Bedouin population does not exceed 150,000.

1/ Badia Rangelands Development Project, Appraisal Report: Infrastructure Development (1997).

2/ Bazza, M. and Najib, R. FAO 2003, Towards Improved Water Demand Management in Agriculture in the Syrian Arab Republic.

In the past, communities living in the Badia and dependent on its resources coexisted harmoniously, preserving traditional local knowledge and well-diversified resources (fauna and flora) within the area. Because of the limited grazing resources and the scarcity of water, most herds left the Badia for the entire hot season to graze crop residues and stubble in other settlement zones. This created an extremely beneficial complementarity between different ecological sectors and production systems. For example, when animals grazed agricultural sub-products, this allowed good use of several millions of feed units and the animals contributed to soil fertilization (manure); when animals grazed on the mountains, plants in the plain were given a chance to recover. Sheep were raised and managed in such a way that the free-grazing rangelands of the steppe in the eastern regions of the country were used efficiently over a period of four to six months each year. Crop residues in the western and northern territories were used during the rest of the year. This situation was stable up until the 1940s.

From the early 1950s to the mid-1990s, the Badia was heavily exploited for rainfed cropping – mainly barley. Wealthy inhabitants and merchants from the main cities such as Aleppo, Hama and Homs established agreements with herdsmen and shepherds in the Badia to undertake cropping on a large scale. The merchants provided seeds and tractors while the herdsmen supervised ploughing and ensured protection of the cropped site. If there were crops to harvest, they shared the grain; if the year was bad, the herdsmen would graze the whole area and avoid buying feedstuffs, thus saving money. Tractors were brought in and all depressions and sites where good soil was found were cultivated. The introduction of tractors and the involvement of merchants who were not necessarily stock owners expanded cropping to more vulnerable areas. The livestock populations increased in parallel, but ownership of most flocks changed. New stock owners did not always directly manage their flocks and shepherds were hired and/or organized into associations. In the early part of this period the Syrian Government's agricultural plans committed 30 per cent of the rangelands to cultivation, with the objective of saving the remaining area as rangelands.

The Government allowed investment in cultivation under irrigation, a practice that proved to be unsustainable. Controlling and/or eventually banning cropping in the Badia was subject to ever-changing Government positions. Nevertheless, a decree issued in 1970 (Decree 140) was the first attempt by the Government to prevent the appropriation of rangelands and to ban cultivation on non-irrigated steppe lands (e.g. in the Badia).

The use of groundwater for irrigation expanded rapidly, since pumped water is free and the only investment expense required was a well and a suitable pump. Farmers dug their own wells, obtained credit at preferential rates of interest to purchase fuel and imported pumps at subsidized prices. For the large number of farmers with small plots of land, irrigated cropping was the most viable means of using their land. By 1999 there were 201,259 wells, of which 25 per cent were unlicensed.

These practices ignored the capacity of this fragile area and disrupted the traditional patterns of resource management that are based on the complementarity of the five settlement zones and seasonal migrations out of the Badia. They also depleted the natural forage resources, increased the pressure on water resources and initiated a spiralling trend of degradation. At the same time livestock populations increased, but ownership of most flocks changed as the extensive livestock industry became a real business and merchants and inhabitants of large cities began to own large proportions of the stock in the Badia. New stock owners did not always directly manage their flocks. Traditional knowledge and management practices were gradually lost, while increasing the size of herds became the most favoured strategy for hedging risks due to rainfall fluctuations and the unpredictability of the barley harvest.

Until 1995 many herders and non-herders alike cultivated rainfed barley. Harvest or no harvest, they fed their herds on the crop residue and in a good season had the bonus of some grain to sell or feed to their animals. This was a system of mutual benefit to both merchants and herders. In most cases, the merchants advanced money and goods to the herdsmen, who became indebted to the point that they could not abandon the system of their own volition. This combination of cultivation and herding suited them well, but in the long term was untenable. Barley cropping was eradicating the natural vegetation and constant ploughing was ruining the soils.

In the early 1990s the Government began to curb the indiscriminate cropping and digging of wells that was degrading the Badia at a considerable rate. From 1992 onwards new policies promoting rangeland conservation and protection were introduced. Cultivation was prohibited in the non-irrigated steppe lands, which were to remain exclusively for natural and planted rangeland and shrubs. The areas previously used for cropping were to be gradually planted with shrubs. In 1994 the Government banned cultivation on areas of rainfed steppe “in order to protect the natural vegetation in the Syrian steppe and stop its degradation, because natural vegetation is an essential resource for grazing.” Finally in 1995 the Government imposed a comprehensive ban on all cultivation, whether irrigated or rainfed, in the Badia. In this way cropping was definitively prohibited in the Badia. In 1999 and 2001 the Government also introduced regulations to halt and then ban the digging of wells in the cretaceous layer, except for drinking purposes.³

The cropping ban and transformation of the ploughed areas back into rangelands, combined with the new status of the Badia as a reserve for extensive livestock rearing, have been important elements of the Government of Syria’s long-term strategy for the area. However, at the time of the 1995 cropping ban the degradation was so advanced that prohibiting cropping alone was not sufficient to restore the rangelands and their biodiversity. Land that had been repeatedly ploughed with a disc plough was left stripped of any perennial vegetation. Typically, once abandoned, these areas saw the growth of some cruciferous species for the first two or three years, but after that they often reverted to bare earth, with a hard cap of soil preventing any life processes from taking hold, or else were colonized by aggressive and unpalatable invader species with almost no appeal for livestock. This also led to the disruption of the water balance within the soils, because the hard crust over the soil prevents infiltration of rainwater and favours increased evaporation. Likewise, lack of decomposition and increased oxidation of organic materials leads to an imbalance of organic matter in the soils, and most seed species are incapable of burying themselves, germinating or growing substantially under these conditions. In addition to the damage caused by cropping, overgrazing in other areas had contributed to the regression of the plants that are most nutritious and palatable to animals, leaving only those that are spiny, toxic and/or unpalatable.

Thus, cropping, overgrazing and increasingly severe drought have all taken their toll on the rangelands and some areas have become irretrievably degraded. By the late 1990s, degradation overall had become so advanced that in most years the Badia was not able to cover more than a quarter of the annual forage requirements of the small ruminant populations. Because there was so little left to graze, the flocks became dependent on feed subsidized by the Government, and on more frequent and longer migrations to the west and north-east regions of the country in search of better grazing, feedstuffs and crop residues outside the Badia. Gradually, incomes and living conditions deteriorated, and many herders were forced to sell their flocks. Households shifted to other activities or became dependent on remittances sent back by male members working in the cities or abroad.

In herding households in the Badia women manage most of the domestic affairs and perform a range of livestock-related tasks such as herding, milking and cleaning animal sheds or pens. About 78 per cent of women take part in sheep rearing activities and only 15 per cent (representing the older women) carry out solely domestic duties. Women are busy continuously during the day, presumably excluding household tasks; 42 per cent work 10 hours or more a day, while 46 per cent work between 5 and 10 hours a day. Women and girls are also generally responsible for fetching firewood and water, if this can be done within a reasonable distance from the home. A study conducted by the International Center for Agricultural Research in the Dry Areas (ICARDA) shows that women’s contribution to economic activity tends to be seasonal with peaks occurring in the milking and hand-feeding seasons during winter and spring. Both activities are typically undertaken by women. Milk processing is also considered to be women’s work, which adds to their workload during milking seasons.

3/ FAO, 2003. Water Resources Management in SAR with emphasis on non-conventional sources. TCP/SYR/0167. January.

In order to halt and reverse the deterioration of the rangelands, the Government has implemented many nationally and internationally assisted programmes and elaborated various scenarios to organize the stock owners, including those living in the villages at the edge of the Badia and the large towns, as well as the Bedouin, into livestock cooperatives.

Since 1959 the Government of Syria has attempted to develop the Badia through a series of programmes and approaches, but none has been an unqualified success. The Regional Rangelands Development Project conducted by the Food and Agriculture Organization of the United Nations (FAO) and United Nations Development Programme (UNDP) included Syria among the six countries involved. The project piloted the participatory approach and the concept of holistic resource management from 1987 to the early 1990s. Four main technical innovations were introduced for rangeland development and management:

- (i) Short-term resting of rangelands followed by regular but organized grazing to replace the earlier conservative technique of using long-term enclosures, which generally excluded any use of resources and in the long run led to further degradation as a result of the enclosed areas being insufficiently used.
- (ii) Using the grazing animals to boost the dynamic trends of the rangelands and their development through hoof action, rejuvenation, improvement of the organic matter balance, etc.
- (iii) Reseeding native species to orientate and stimulate natural regeneration and gradually replace the costly planting of fodder shrubs.
- (iv) Adopting a participatory approach based on the involvement of well-identified groups of beneficiaries exploiting well-known and recognized rangeland sites. The groups were involved in identifying basic community needs and scope for participation, physically implementing technical packages, protecting developed sites and applying communally elaborated management plans.

FAO then designed and implemented a project in the Syrian steppe that built on the results of the FAO/UNDP project and was aimed at rehabilitating rangelands and establishing a wildlife reserve at Al-Talila.

The various methods, approaches and technical packages applied demonstrated that it was possible to plant fodder shrubs to rehabilitate the terrain, but achieving sustainable rehabilitation and the collaboration of the Bedouin herders was a much greater challenge. This aspect was successfully addressed by the IFAD-supported BRDP project.

Institutions operating in the Badia

In recent decades the Government of Syria has intervened through local institutions to protect and minimize damage to the rangelands. In 1975 a directorate dealing with the Badia was created and many *mahmiat* or protected grazing areas were established. The approach of this directorate was to organize herdsmen into cooperatives, with each cooperative having its own allocated rangelands. Basic infrastructure, including the construction of new water points and the rehabilitation and operation of boreholes, was expanded to most parts of the Badia. But cooperative rangelands had never before been delineated or allocated, and the Badia Directorate proceeded to establish *mahmiat* on a top-down decision-making basis, without any consultation with the Bedouin. Grazing within these *mahmiat* was available on a rental basis to some stockowners. The Bedouin did not feel involved, and appropriate management and protection of these *mahmiat* could never be ensured. In this context, the Badia Directorate was the sole authority taking decisions on who could graze their flocks and where. Often stocking rates and grazing period durations were not respected. Consequently many of the *mahmiat* degraded rapidly. There was thus a distinct need for full participation of the Bedouin in the development and management of the rangelands.

In 2008, the former Badia Directorate became the Badia Protection Directorate, whose main task was to control and report any illegal cropping in the Badia. In addition, a new Badia Authority was created. Its Director General reports to the Prime Minister's Office and has very little to do with the Ministry of Agriculture, particularly where extensive rangeland development is concerned. In this respect there is a strong need for coordination between this authority and the

Ministry of Agriculture concerning the programmes and the approaches to be applied for the development and management of the rangelands in the near future.

The General Union of Farmers (GUF), which includes the herdsmen, plays a key role in granting authorizations to cooperatives to manage their grazing areas. During the last few years of project implementation, the GUF changed its position vis-à-vis the participatory approach. This shift in position could affect scaling up activities and any further rangeland development programmes. A recommendation addressing this aspect is formulated in section IV.

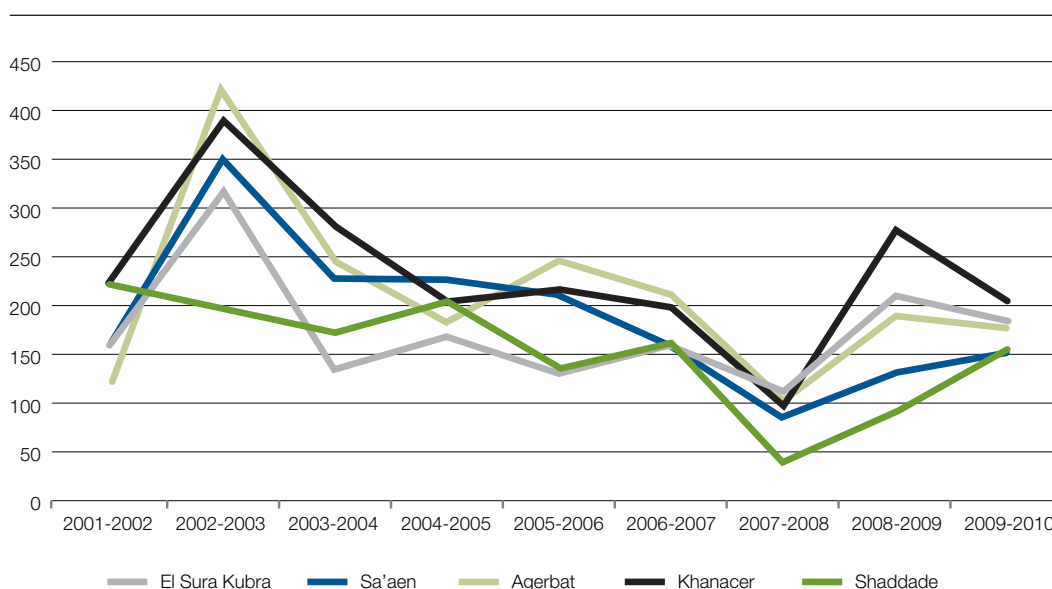
The impact and evidence of climate change

There is no doubt that climate change is affecting the Badia. Over the past 30 years there have been clear changes in rainfall patterns, with droughts becoming more frequent and more severe. Rainfall averages in the Badia have decreased by 36 mm over the past ten years, varying from 15 mm in Agerbat and El Mayadine to 72 mm in Raqqa, compared with averages calculated for the twenty-year period prior to project implementation (figure 3). There have also been marked fluctuations in amplitude – the minimum and maximum temperature. An unexpected frost in 2008 was extremely destructive to vegetation in the Badia.

One of the consequences of these climatic changes is an increase in sandstorms. This can be very damaging to vegetation and presents a health risk to people. The precise increase in frequency and the economic and social impact of increased sandstorms in the Badia have yet to be evaluated. All of these climatic changes exacerbate problems that are already acute in the Badia: scarcity of water and the degradation of rangeland.

Rehabilitation coupled with careful management to sustain productivity of the rangeland is a significant first step towards adapting to climate change. Reintroducing native plants, helping meet fodder requirements, fixing the soil and stopping the movement of sands, allowing the general rehabilitation of ecosystems, and preserving and improving livestock breeds that are best adapted to drought conditions, are all crucial activities that reinforce adaptability and reduce the vulnerability of local populations to the effects of climatic instability.

Figure 3 Rainfall decline (in mm) over the past 10 years in selected locations in the Badia



III. IFAD's role and intervention in participatory rangeland management

IFAD has worked with the Government of Syria since 1982 and to date has supported a total of eight projects in the country, investing a sum of US\$154.2 million in loans for projects with a total value of US\$533.3 million. IFAD has now acquired extensive experience of rangeland management and rehabilitation in arid and semi-arid areas. In particular, the design and implementation of the BRDP drew on the very successful IFAD-supported Livestock and Rangelands Development Project in the Eastern Region of Morocco (1991–2010), which placed resource management, rehabilitation and decision-making firmly in the hands of the herders.

The project

Recognizing the need to rehabilitate the severely degraded rangelands and restore fodder production for the livestock pastured there, the Government of Syria initiated the IFAD-supported BRDP. The BRDP became operative in late 1998 and closed in 2011. The project was cofinanced by IFAD (US\$20.2 million), the Arab Fund for Economic and Social Development (US\$65.0 million), the Cooperative Agricultural Bank (US\$1.8 million), the Government of Syria (US\$16.6 million) and the herders themselves, for a total cost of US\$104.9 million.⁴ The project targeted about one third or 3.2 million ha of the Badia rangelands in the provinces of Homs, Hama, Aleppo, Raqqa, Deir Ezzor, Hassakeh, and to a lesser extent in Sweida and Dara'a provinces to the south, which represent less than 16 per cent of the total area. A total of 16,800 families belonging to livestock cooperatives were direct beneficiaries of the project, with a further 10,200 households obtaining indirect benefits, for example from water resources, new roads, veterinary services, reduced desertification and an improved biodiversity.

The overall project management and coordination were the responsibility of the Ministry of Agriculture as lead ministry. Implementation was carried out by a project management unit, coordinated and run at the provincial level by provincial project management units established in each province.

Rationale and objectives

The overall objectives of the project were to restore the productivity of the rangeland to its optimal potential and contribute to the socio-economic development of the target areas. The project aimed to support the Bedouin population by limiting the need to migrate frequently over large distances. Beneficiaries were organized into cooperatives or other groupings to function as delivery channels for the implementation of project activities. The project placed emphasis on achieving maximum sustainability of all development objectives.

The areas of intervention were selected from among the parts of the Badia that had previously been cropped and degraded areas that showed the potential for a substantial and rapid recovery.

Methodology and approach

The project constitutes the first successful attempt in Syria to apply a fully participatory approach to the development and management of communally used rangeland resources. Previous attempts to rehabilitate the rangelands had not been entirely successful, chiefly because they failed to achieve long-term sustainability as a result of the lack of involvement of the Bedouin in the processes implemented. This project was as much concerned with rehabilitation as with ensuring that Bedouin communities were willing and able to continue managing their regenerated rangelands for optimum productivity once the project closed. The key to the success

4/ All costs are expressed in values of early 1997.

and sustainability of this project has been ensuring, through capacity-building and empowerment, that participants take part in decision-making. This, in turn, has contributed to securing full community ownership of both rehabilitation and management of the rangelands, and a commitment to continuing rangeland management beyond the project. The participatory approach to the management of natural resources had proved a winning and sustainable formula in a number of IFAD-supported projects, notably the Livestock and Rangelands Development Project in the Eastern Region of Morocco cited above.

The participatory approach was an innovation for beneficiaries, Government authorities and project management alike. The greatest challenge faced by the project was changing the attitudes of the herding communities, who had grown accustomed to top-down interventions and had long since lost the concept of participatory management of their resources. The herders were suspicious of this new approach at first, believing it would generate a conflict of interest, as had arisen in past Government projects. These suspicions were compounded by the lack of familiarity with the participatory approach in Syria, and the fact that illiteracy is widespread in the Badia, creating difficulties in understanding and a tendency to rumour spreading. Power distribution within tribes and groups is complex, and some groups are dominated by strong leaders unwilling to share decision-making. Some of these local leaders are powerful but do not own sheep, so are not interested in the development of the rangelands.

The project tackled these issues by first approaching and convincing some of the more open-minded community leaders, who are in most cases heads or members of the livestock cooperative committees, in the hope that others would follow suit and join the project when they saw the benefits incurred. An IFAD grant provided training on the participatory approach to project technicians and the communities of the first set of cooperatives that elected to collaborate with the project.

Using a variety of approaches – film visits, meetings with communities, field days and workshops – project staff brought communities on board and provided them with information about the new rangeland management techniques used by the project, such as rangeland resting, rangeland seeding and planting of fodder shrubs. All rehabilitated areas were subsequently grazed during appropriate periods using suitable rates. Among the first groups to be approached were the former livestock cooperatives, most of which had transformed themselves into service provision cooperatives and were supplying feedstuffs at subsidized prices to their members, given that the rangelands were so severely degraded. These cooperatives were renewed prior to project implementation start-up and committees, including a rangeland committee, were elected under their auspices. The rangeland or grazing committee of each cooperative was formed of four or five members. Ideally, at least one member was a woman. This committee, which participated with project staff in the elaboration of rangeland management plans, was responsible for the protection and management of the developed rangeland sites in their community.

From the start the project's principle was to intervene and collaborate only with well-defined groups of herders who were willing to commit themselves to participating in all project activities. In order to be included among the target beneficiaries, each community had to be demonstrably free from conflict, both internally and with neighbours. A participatory approach only functions well when communities are cohesive and well organized. Communities that were not able to agree among themselves and form a unified cooperative were not included in the project. This has made it possible for the project to progress where little or no conflict exists and to implement rangeland rehabilitation beyond planned objectives.

An IFAD grant and the CARE International Jordan branch provided training on the participatory approach to project technicians and the communities of the first set of cooperatives that elected to collaborate with the project. Figure 4 gives the number of cooperatives collaborating with the project during the period 2000–2010.⁵

5/ Badia Rangelands Development Project, Loan 477-SY, Supervision Mission: 23 March–11 April 2010.

Results and accomplishments

Formation and capacity-building of grazing committees

(a) Grazing committees

Once the cooperating communities had been identified, the project began implementing the technical packages and training programmes, as well as all other community development activities.

Although the land is state-owned, traditional rights of access are apportioned among tribes, clans and families. Once communities had agreed to collaborate, the project worked closely with them to identify boundaries according to accepted grazing rights established over many generations. Together with project staff, they then selected sites suitable for rehabilitation. The committees or cooperatives were validated by the GUF.

Grazing was restricted to growing and dormancy seasons in order to stimulate plant growth and seed production during periods of rainfall and to maintain positive dynamic trends of the most important rangeland types. With their considerable local knowledge – of soil conditions, vegetation types, interaction between animals, vegetation and availability of water, among other things – the Bedouin herders were encouraged to work with the project experts in drawing up viable management plans – where to graze over a given area, how many sheep, and at what time, according to seasonal conditions. This knowledge was checked through scientific assessments undertaken by the project staff and was incorporated into the management plans.

The project engaged a total of 141 herder cooperatives (figure 4), reorganized into 136 homogenous communities that were represented by 174 rangelands committees. There were more committees than cooperatives, because some of the large cooperatives were split into two or more sub-cooperatives within their own committees. These communities committed to participating in the selection of sites to be developed, pledging to protect them from intruders and to apply range management plans developed with the project staff. Most of these cooperatives were ready, at project close, to continue protecting and managing their rangelands without the support of the project.

(b) Services to participating communities

Eighty-eight per cent of the active workforce engages in herding. However, about one third of the herds have fewer than 50 animals.⁶ Consequently, poverty affects a large portion of the Badia inhabitants. In addition, employment is scarce in this hostile environment. Taking all this into consideration, the project offered employment opportunities in addition to loans, improved sheep breeds, literacy and training courses, and other benefits. In targeting these benefits, priority was given to members of cooperatives collaborating with the project, and when possible, to neighbouring communities. These services constituted an important incentive to join the project.

The employment opportunities created by the project brought substantial benefits in the form of additional income to the collaborating communities. It is planned that planting of fodder shrubs will continue after the project with Government support, thus potentially continuing to offer seasonal labour. Work as seasonal labourers – in seed collection and cleaning, and planting of fodder shrubs – and as stewards or guards protecting developed rangeland sites provided a welcome addition to household income and allowed many young people, particularly women, to begin earning independently. Labour is unofficially reported as the second most important benefit brought by the project to communities.

It is important to point out that a large number of cooperatives contributed with an area of less than 5,000 ha each (figure 5). This size generally represents only a fraction of the cooperative's total rangeland area and could translate into potential for scaling up within these cooperatives after the project.

6/ Socio-economic survey of the Badia household within the project area (2001) conducted by IFAD, Ministry of Agriculture and the Arab Fund for Economic and Social Development.



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Sheep grazing on a Badia rangeland site

Figure 4 Number of cooperatives collaborating with the project

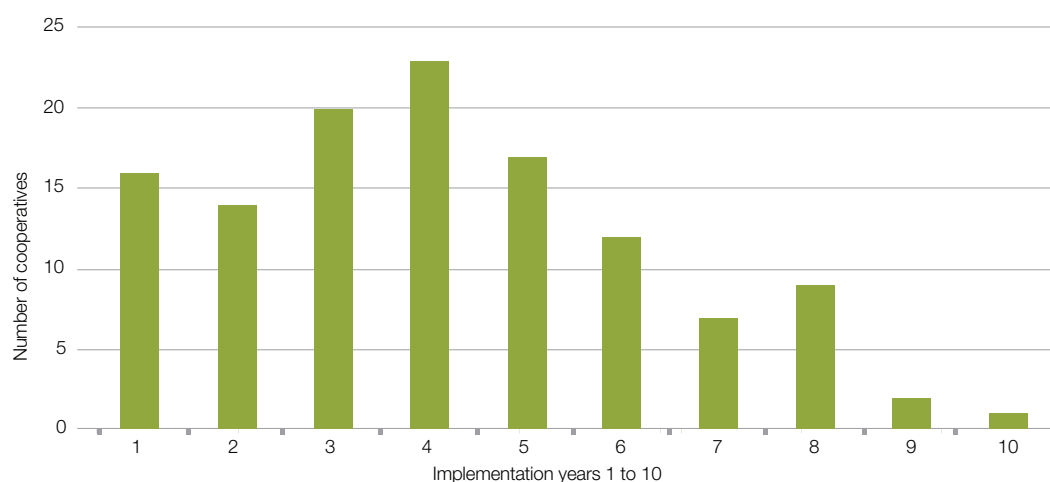
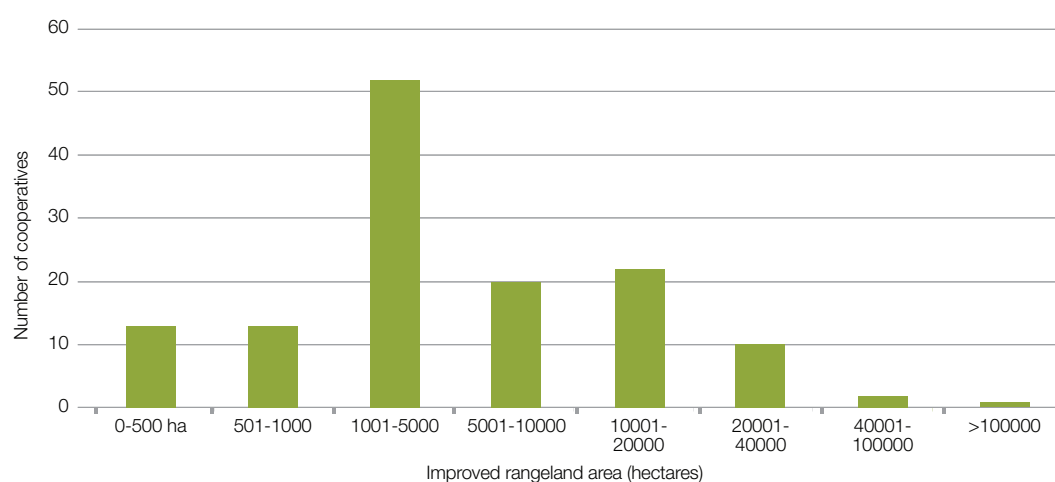


Figure 5 Number of cooperatives by size of improved rangeland area



(c) *Sanduqs*

The grazing committees enforced the new grazing regulations and were free to choose whether or not to charge a fee per head of sheep grazed in the rehabilitated rangelands. The funds collected could be used to contribute towards reserve management, including paying for a guard to keep out intruders. Protecting the land gives a greater sense of control and ownership, even if the land is ultimately Government-owned.

Some 28 *sanduqs*, or revolving savings funds, were created in 28 cooperatives. Even though the number of *sanduqs* appears modest compared with the total number of committees, it should be noted that this is quite an important innovative achievement given that the rules governing the cooperatives do not explicitly encourage the creation of *sanduqs*.

Different operating modalities were applied from one cooperative to the next. About 19 cooperatives collected grazing fees of 5-10 Syrian Pounds (SYP) per head for each grazing period, while the remaining nine cooperatives did not collect grazing fees, but organized themselves to ensure the protection of their rehabilitated rangelands against intruders by contributing in kind (e.g. to the purchase of gas for use by the guard).

The technical package: resting, reseeding and planting

Rehabilitation of the rangelands required specific technical packages to regenerate native species of high-value forage and stimulate the natural healing of all damaged ecosystems, while also ensuring greater resilience to drought in the years to come. The project took three approaches to rehabilitation according to the gravity of conditions: resting, reseeding and planting. Each technique contributed to the improvement of the general situation, rehabilitating the environment and ensuring productivity on a sustainable basis. The package incorporates the cumulative effects of these simultaneously applied techniques and is a significant innovation. It aims to restore plant cover and increase forage production using well-adapted, native species of high-value forage without overly reducing the amount of grazing available at any given time. The principle of reseeding and planting is based on the use of native and/or well-acclimatized high-value forage species. Resting aims to stimulate the recovery of good local forage species threatened with extinction. The recommended techniques have the added benefit of being easily and cheaply replicated by willing herder groups.

(a) Resting degraded areas

Where possible the land was simply rested for a maximum of two years. Here the innovation was to rest the land, rather than introducing long-term enclosures. With long-term enclosures, whatever is gained in terms of restored plant cover and increased forage is offset by the greater degradation of neighbouring areas, as herders forced off the enclosed area overgraze the surrounding land. In arid zones it often happens that after a short period during which access to grazing resources is prohibited, the area is almost immediately overgrazed again. In the long run, long-term enclosures lead to more degradation than improvement.

However, if appropriate management plans are in place, resting allows the Bedouin and their flocks to make use of available forage twice yearly after the first two years of resting. Also, the introduction of the animals can even help stimulate regrowth and regeneration, if controlled grazing practices are observed thereafter.

Resting allows the native plants to recover, reconstitute their seed banks and gain vigour. This system can achieve substantial impact on rangeland sites showing evident signs of recovery, including the presence – however minimal – of high-value forage and palatable native species, and where the topsoil is uncapped, has a very fragile new capping or is barely covered with a veil of sand and/or gravel, all of which are necessary to improve the water balance and encourage the multiplication and growth of the plants. To avoid reversing the dynamic trend of regeneration and regrowth, the rested areas should be grazed from the end of the second year of the resting period, and thereafter twice a year.

This is the least costly rehabilitation solution, and in many cases where applied by the BRDP produced significant results, confounding even the expert ecologists. Native plants that had long since disappeared returned and the full range of vegetative cover was regenerated, while the

aggressive invader plants that had colonized the sites during the period of anarchic grazing had regressed. By project close a total of 963,870 ha of the Badia had been regenerated through resting, amounting to 112 per cent of target objectives.

(b) Reseeding on a large scale – an important innovation

In many parts of the Badia degradation was too advanced and resting alone was not enough to regenerate the vegetation. In these cases, reseeded or planting was the only option. Reseeding helps to initiate and speed up the process of regeneration, and is essential in recolonizing severely degraded sites with native species that have been removed by disc ploughing and/or overgrazing. The species to be used in reseeded were selected in consultation with the herders and technical staff. Use was made of the native plants most valued by the herders and best acclimatized to local conditions and self-regenerating, preferably germinating seeds under prevalent environmental conditions on treated sites. In the case of the Badia the recommended species were *Salsola vermiculata*, *Atriplex halimus*, *Atriplex leuoclada* and *Atriplex canescens*. Most of these were not readily available in large quantities either locally or in international markets. Consequently, seed had to be produced by the project.

Reseeding of large areas requires vast quantities of seeds. Since reseeded on such a large scale had not been attempted before, the challenge was to produce enough seeds, especially for the perennial shrubs. The project demonstrated that it is possible to produce seeds within the country for extensive rangeland rehabilitation. It also proved that regeneration can take place through reseeded alone, if the conditions are right.

The production of seeds rapidly exceeded project needs. Six seed production farm units were established and operated by project staff and hired local labour. These units are now producing a massive 200 tons of seeds per year, mainly used to cover the vast areas involved. Some seeds were given to the Arab Centre for Studies of Arid and Dry Lands (ACSAD) for the benefit of country members wishing to use the seeds in their rehabilitation programmes. The seeds are all derived from high-value forage plants that are native to the rangelands or plants acclimatized to local conditions with good palatability for animals. In areas where soils are very compacted, the ground is first broken up to allow water infiltration and encourage the seeds to enter the soil, germinate and grow. The total area reseeded by the project amounts to 226,550 ha. This represents 125 per cent of the appraised target area. ACSAD received a donation of 18.5 tons of seeds for dissemination.

Thanks to the efforts of the BRDP, Syria has become a pioneer in the field of seed production using native species and other species well acclimatized to the Badia. The mass production of seeds has been an important technical innovation introduced by the BRDP, to be shared with other countries facing similar conditions and challenges.

Reseeded sites offer a significant increase in high-value forage two years after reseeded, while also spreading seed to neighbouring areas and thus furthering the regeneration process. As with resting, reseeded sites should be grazed from the end of the second year, in order to avoid regression of the dynamic trend and to maintain good palatability and accessibility of the plants.

(c) Planting fodder shrubs

Despite the high success rate of reseeded native species, greater diversification of vegetation is needed in order to meet the specific needs of the various ecological areas. For this reason the project established pastoretums to cultivate the seedlings of alternative fodder species that were then planted throughout the target area. The species used for planting were *Salsola vermiculata*, *Atriplex halimus*, *Atriplex canescens* and *Artemisia herba alba*. The BRDP also contributed financially to the rehabilitation and upgrading of existing nurseries throughout the Badia, in collaboration with the former Badia Directorate. All nurseries were later handed over to the new Badia Authority for management beyond the project. Personnel from both national institutions (Badia Directorate and the new Badia Authority) were given the opportunity to benefit from training and study tour sessions in order to widen their experience and reinforce collaboration with BRDP technical and administrative staff. This capacity-building and collaboration is an important aspect of the work of the project that contributes to the sustainability of interventions.

The planting of fodder shrubs is the most costly of the three rehabilitation alternatives and is recommended as a solution to three main problems. First, in arid zones such as the Badia, the reseeding calendar can be altered by the quantity and timing of rainfall, which can affect management plans and delay improvements to the rangelands. To avoid that happening, shrub planting can be undertaken even in a situation of severe drought, because the water balance at plant level can be corrected through watering. Second, planted fodder shrubs can rapidly and substantially contribute to an increase in the availability of forage, which releases the pressure on reseeded and native rangelands, especially during the first years of management when reseeded and rested areas are not yet providing forage. Thirdly, fodder shrub plantations, alongside reseeded sites, help create reserves that relieve pressure on forage resources during periods of drought. This depends on the species planted, but most planted areas can be grazed by the end of the first year and not later than the end of the second year after planting.

At project close 105,116 ha across the Badia had been planted with nursery shrubs (112 per cent of the appraised package). Each plant was surrounded by a small handmade soil bank, which provided protection and an efficient means of collecting rainfall run-off – a natural form of supplementary watering. Regular livestock cropping prevents shrubs from growing woody and prolongs their life. Eventually they reseed themselves between the planted lines of planted shrubs. One of the problems encountered was compacted soils that made natural reseeding very difficult. This can be solved by breaking up the hard surface of the soil, through light scarification or animal hoof action.

(d) Forage production of improved rangeland

The three techniques (resting, reseeding and fodder shrub planting) are complementary and should always be applied together. Together they favour a balance of seed stocks in the soil and speed the process of regeneration. Table 1 shows the additional rangeland forage productivity (from year one of treatment to year six of maximum production) achieved in response to each technique applied. Outside developed sites, average production does not exceed 35 fodder units (FU)/ha per year and only reaches 100 FU/ha in depressions and other favoured sites. By comparison, forage production attained during the sixth year following the application of the technique amounted to: 350 FU/ha under resting; 500 FU/ha through reseeding; and 600 FU/ ha through planting.

Table 1 **Production in FU/ha for each technique applied for rangeland development**

| Years since start of technique application | 1 | 2 | 3 | 4 | 5 | 6 |
|--|-----|-----|-----|-----|-----|-----|
| Resting | 125 | 200 | 300 | 350 | 350 | 350 |
| Reseeding | 100 | 200 | 325 | 450 | 500 | 500 |
| Planting | 125 | 250 | 425 | 600 | 600 | 600 |

Source: Badia Rangelands Development Project, Third Quarter Progress Report (2010).

(e) Added benefits of ecosystem health

Rehabilitation should not be focused solely on providing more fodder, but also on attaining a healthy ecosystem with improved biodiversity. Indeed, pending the results of a systematic environmental impact study, it is possible to draw the following conclusions about ecosystem responses based on field observations: (i) the techniques allowed regeneration of rare desirable rangeland species (*Salsola vermiculata*) and improved vigour in general; (ii) reduced erosion intensity and frequency of dust storms; and (iii) improved animal diversity (e.g. reptiles, birds, rabbits). A healthy ecosystem is a sustainable ecosystem, with all elements supporting one another and together providing greater resilience to drought. Despite the fact that project impact was affected by severe drought sequences, the rehabilitated rangeland continued to provide grazing material, albeit at reduced rates.

Flourishing ecosystems offer further potential for income generation. Truffles grow naturally in some areas of the Badia and have proliferated in rested areas as a result of the improved

Box 1 Rehabilitated livelihoods

Rajeb Muhamed is head of the Baghale cooperative in Homs province. The 60 members of the cooperative have planted and reseeded 4,500 ha and rested the remainder of their 19,000 ha. "At first we did not believe it was possible to regenerate the land. We did not have the knowledge. Now we are fully convinced. In fact we want to rehabilitate the whole area. We set fees for entry to graze – this was not common practice in the past. As a result of protection we're seeing new plants appear, and the health of the sheep has improved. Those outside the project live from day to day, they have no long-term vision. This is how we used to be. What we save on fodder now is SYP 15,000 (US\$325) per day – that's all increased profit."

Abdelaziz el-Ahmed is 33 years old and is based in the Takaia area in Aleppo province. He and his brother, their wives and children make up a total household of 25. They have 430 sheep. "There was nothing left for the herds to eat," he says. "We had to move 400-500 km away. Two years ago we joined the project and planted 400 ha of fodder shrubs. When we saw how successful this was in terms of providing good fodder for our herds, we planted another 500 ha area. We plan to rehabilitate the whole area. The savings on fodder just over the last two months have been SYP 2,000 (US\$43) net per head. If we have enough fodder we can invite relatives to graze on our land."

ecosystem health (abundance of host plants, improved soil water conditions). Under the right climate conditions, a community with a 100,000 ha grazing area could earn up to US\$1 million (project estimate for 2010) from truffle collecting. This is made possible by the market availability and access. Honey production could possibly be introduced in the future, given the improved plant cover. Although there are problems of mobility and husbandry to be overcome, the quality of the honey would certainly be very high and would fetch good prices. Indigenous medicinal plants also offer scope for income generation. Special programmes are needed to assess the feasibility of these options.

Rangeland management and the participatory approach

(a) The legal framework for self-management

Based on lessons learned and weaknesses identified in the project design, following the mid-term review of the project it was decided that, to avoid conflict and contradictions with other stakeholders applying different approaches, there should be a clear administrative separation between the project area and the rest of the Badia, where the Badia Directorate operates. The mid-term review also recommended that the rangelands managed by cooperatives should be clearly delineated and self-management should be supported through a legal framework ensuring that these groups continue to have access to developed rangelands for a reasonable period of time, given the commitment they have made to rehabilitation. This period should be at least 40 years and preferably up to 99 years.

(b) Self-management in action

In the first years of collaboration the project provided guidance on assessing the capacity of the rangelands. In the final stages, it focused on enabling grazing committees to evaluate for themselves the grazing capacity of their land in any given season. The role of the project became supervisory in preparation for complete withdrawal.

Communities participated through their committees in the selection of rangeland sites to be developed, managing grazing, protecting the sites from intruders and eventually developing additional rangelands autonomously by means of resting and reseeded. Most of the cooperatives that have been involved with the project have shown themselves to be able and willing to continue protecting and managing their rangelands beyond the life of the project.

In order to maintain a substantial quantity of forage and stimulate the continued improvement of vegetation cover, all developed sites should be regularly used. Two grazing practices were applied for each developed site:

- (i) Grazing during the growing season, which has the benefit of available forage and stimulates plant growth and increased seed production. This kind of grazing should introduce a high stocking rate for brief periods before the plants bloom.

- (ii) Grazing during the dormancy season, which takes place during the summer and early autumn. The stocking rate and length of the grazing period can be adjusted according to the carrying capacity. In general terms, animals can remain at the site until they remove most of the dry annual species and up to 50-60 per cent of edible biomass produced by the perennial plants. The most important requisite is that all the animals leave the site at the same time, just before or just after the first autumn rains. It is important that all herders observe these regulations; prolonged grazing is more harmful to the plant cover than introducing high stocking rates for shorter grazing periods.

Appropriate management of the rehabilitated rangelands is as important as the techniques used to improve the plant cover. Small ruminants can be an efficient rangeland development tool, in that their hoof action breaks up the dry crust of topsoil, helping to bury seeds and improve the penetration of rainwater into the soil. The regular and controlled introduction of livestock into the developed sites also helps to correct the organic matter balance and to rejuvenate most of the woody plants. In the overall BRDP vision, animals play a key part in the development of the rangelands and are not simply a means of converting forage resources into livestock products.

The BRDP demonstrated that it is possible to protect and manage large sites that have been rested, reseeded or planted without any fencing. Once communities mutually recognize the boundaries of their rangelands, a limited number of guards can be engaged (one guard for an area of 5,000-10,000 ha is sufficient to patrol and report intruders or encroachments). Some trespassing occurred on particular sites during the project, mainly because transhumant herders (who were not direct project beneficiaries) were unaware of the existence of the reserves. No conflicts were registered either among the 141 cooperative members involved in the project or with the transhumant herders.

(c) Increased resilience to drought

The drought of 2005 to 2008, occurring midway through the project, was accompanied by a substantial rise in the price of fodder. Many communities that had initially been hesitant to join the project changed their minds when they saw the benefits that it offered. In rehabilitated areas grazing is necessarily reduced during drought years, but even if it falls from three months to one month, there is still a considerable saving on fodder and breeders are not forced to sell off large portions of their flock. Those outside the project found that drought reduced their already degraded rangelands. Hassakeh province is the driest province with very poor soils. Natural resources are so limited that many parts are not worth regenerating. Given the conditions, the results of rehabilitation have been very positive.

Six herders (three project beneficiaries and three from outside the project target area) were separately interviewed in Aleppo, Hama and Deir Ezzor. Collected data concerned:

Box 2 Better grazing in periods of drought

"The rehabilitated rangelands saved us," say the members of the Eastern Al Zemla cooperative in Raqqa province, where rainfall this year is just 45 mm, and the area presents some of the driest and most difficult conditions in the Badia. "We began in 2002 by resting a 4,000 ha area. Until 2005 the weather was good and the results were excellent. We worked with the project and protected the rangelands through organizing grazing. Since 2005 rainfall has decreased dramatically. Despite the poor growth of plants, the rangelands have still provided us with 25 per cent of feed requirements. We want to continue with rehabilitation because we are convinced of the benefits. In the past we had to sell up to half the flock to cover fodder costs." According to Daoud Al-Mazna, head of the local Awassi sheep breeding group and member of Al-Ana'ad coop, Hassakeh province: "The drought was very severe from 2007 to 2009. We had to sell about half our flock to feed the rest. But our situation is better than those outside the project. They were selling 60 per cent or more of their flock, sometimes the entire flock. Despite the drought we had the benefits of the rangeland. There was grazing for the sheep. Outside there was nothing to graze. Nowadays a dry year means there is at least two months grazing a year."

Table 2 **Benefit and cost per breeding unit for beneficiaries and non-project beneficiaries (in Syrian Pounds)**

| | Rainy | | Average | | Dry | |
|-------------------------------|---------------------|-------------------------|---------------------|-------------------------|---------------------|-------------------------|
| | Project beneficiary | Non-project beneficiary | Project beneficiary | Non-project beneficiary | Project beneficiary | Non-project beneficiary |
| Benefit per breeding unit (a) | 10 017 | 5 690 | 8 536 | 4 185 | 6 074 | 662 |
| Cost per breeding unit (b) | 1 695 | 2 128 | 2 158 | 2 964 | 2 569 | 4 496 |
| Net benefit | 8 322 | 3 562 | 6 378 | 1 221 | 3 505 | -3 834 |

Net benefit per breeding unit = (a) – (b)

(i) flock size variations during rainy years, average years and dry years; (ii) husbandry parameters in terms of flock composition and main zootechnical aspects such as culling rates, mortality control, etc.; (iii) reproduction and production parameters; (iv) annual movement inside the flock, including marketing of livestock products; and (v) the cost of inputs including feed stuffs, renting of fodder resources, vets, water, herding and transhumance costs.

Table 2 shows that the net benefit per breeding female is higher for project beneficiaries. However this benefit varies even for project beneficiaries during dry years (when it is about 50 per cent lower than in rainy years and around 30 per cent lower than in average years). Herders who are non-project beneficiaries face a real catastrophe in dry years. Their net benefit is negative (minus SYP 3,834/breeding unit), which means that the herder is losing money to maintain the herd. Consequently, in order for them and their families to survive, herders have to sell most or all of their flock. The situation worsens if the drought sequence lasts more than one year. In this case, many herders are unable to restock and start again. This clearly demonstrates the importance of the project to the sustainability of extensive livestock production systems even during periods of drought. Table 2 also indicates that the cost per breeding unit is lower for project beneficiaries than for non-beneficiaries, particularly in a dry season. In addition, it was also found that project beneficiaries used less than 30 per cent of their income to buy inputs, whereas for non-beneficiaries the outlay on inputs could reach over 85 per cent of their income during dry years.

Socio-economic support

Natural resource management is more effective and more likely to be sustainable in the long term when it is supported by social development interventions. The term "holistic resource management" was coined to highlight the importance of social development alongside the rehabilitation and management of natural resources. Offering a full range of support to the people who use the land and attending to their broader needs helps strengthen the social fabric, and puts communities in a better position to manage the resources they depend on. These services also constitute an important incentive in convincing communities to collaborate in the early stages of the project (see section III).

The BRDP introduced a number of community development components alongside rangeland development. These ranged from the establishment of institutional bodies capable of implementing a fully participatory approach, to programmes specially designed to improve educational and literacy levels and the socio-economic status of women. A rural infrastructure component provided improved water supply and rural roads, and a livestock development component offered support in breeding, animal management and health, and the processing of livestock products.

(a) Rural infrastructure

At project start socio-economic conditions in the Badia were very poor and infrastructure was weak. In particular there was an urgent need for more schools, rural roads and improved access to water for both human and animal consumption. The project built 650 km of roads, linking remote villages to markets and services and, crucially, to water points. It also invested in new schools.

Water is a vital and scarce resource in the Badia. The project drilled and equipped 69 boreholes, rehabilitated 35 old wells, rehabilitated and equipped 110 shallow wells and 1,012 Roman wells or cisterns, and dug 39 *hafirs* or reservoirs in which to collect rainwater (see photo). Since much of the water drawn from underground has a high salt and gypsum content, nine desalination units have been established, each producing about 100 m³ of drinking water a day. In this way beneficiaries now save on the cost of buying and transporting water for household use and for livestock, and water points are located closer to homes or settlements.

(b) Employment opportunities

Project activities provided excellent employment opportunities for cooperative members and their families. For at least six months of the year employment was available for guards, tractor drivers and plantations and seed collection labourers, representing significant income support for



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New paved roads in the Badia improve access for local communities



© IFAD/Sarah Morgan

A *hafir*, or reservoir designed to collect rainwater

households and the local economy. Some employment opportunities will continue beyond the project in the protection and management of the rehabilitated rangelands and in the scaling up of activities such as fodder shrub planting.

Over the duration of the BRDP, the project provided more than 700,000 days of temporary labour, which constituted an important source of income for poor herding communities. The project also hired 714 employees on a monthly salary basis.

To some extent, these employment opportunities will be sustained, now that the project will continue to function under the Ministry of Agriculture; the new IFAD-supported Integrated Livestock Development Project will also ensure some continuation.

(c) Literacy

Illiteracy is widespread among the Bedouin. Their nomadic lifestyles mean the school dropout rate is high and many children, particularly girls, lose out on formal education. Illiteracy creates a considerable social and economic divide between these communities and the rest of the country, and is a major factor here, as elsewhere in the developing world, in perpetuating poverty. At project start the majority of inhabitants (72 per cent) of the Badia were illiterate; only 22 per cent had primary level education and just 6 per cent had attended secondary school.

Training courses offered by the project gave adults a chance to acquire literacy skills. Illiteracy has now been eradicated in 70 villages across the Badia. One of the many benefits of raising literacy levels is that farmers are now able to register and record their rangeland management plans and improved Awassi sheep holdings and milk output.

Women

Women in the Badia living in herding households play a major role in managing domestic affairs, as well as undertaking various livestock-related tasks, including herding, milking, processing milk, feeding livestock and cleaning animal pens. About 78 per cent of women take part in sheep-rearing activities. The degradation of the rangelands has added further to their burden of work. By the same token, rehabilitation, the provision of good quality water and other project activities have relieved women of some of their workload.

The project has done much to address women's needs and to improve conditions and create job opportunities for women. The main objective of these interventions was to increase social awareness and self-confidence in women, and enable them to improve their incomes and well-being and participate to a greater degree in the development of their communities. Literacy classes are the foundation of this work, given that most Bedouin women are illiterate. Training courses in new skills such as first aid, food processing, knitting, sewing and hairdressing have eased women's work in the home and opened up income-generating opportunities.

Box 3 Reduced migration relieves the burden on women

Khatma Shigeer is 50, and is married with two boys and five girls, aged between 25 and 8 years. Her family has grazing rights within the Qasr El Hir Sharqi site in Deir Ezzor province. Of the girls, only her 10 year old has received any schooling, and just for one year. The school only recently opened in their area. But constant moving and the need for extra help with the flocks ruled out the chance of schooling. Her 14 year old son dropped out of preparatory school to help with the herding.

While her husband and sons travel with the flock, Khatma and her daughters spend the day in the tent. They prepare the food, make bread every day, clean the tent and wash clothes. They are also responsible for milking the sheep and goats twice a day and taking the milk to the cheese-maker. At night they put the animals in their pens. In spare moments Khatma stuffs pillows with wool. In the winter she weaves tent material from goat hair.

"Things are much better since we created the reserve," she says. "Before, we had to go far away to the east looking for grazing. We went right out to the Iraqi border. There were a lot of people in the area and we faced the problem of crossing through protected areas. It was a lot of work for me because we were moving on a daily basis. Every day we had to take the tent down. There was only saline water to drink, and there was no school for the children to attend. Now we move in a five kilometre radius within our own land. We have a bigger flock and better milk production."

Women have also worked as labourers in the reseeded and planting of fodder shrubs, and seed collection and cleaning. They have therefore played a significant role in rangeland rehabilitation and, in doing so, have made a vital contribution to household incomes through their earnings.

Livestock production

In order to optimize productivity and incomes for Bedouin herders, the BRDP introduced a livestock development component aimed at boosting the extensive livestock production systems in the Badia alongside rangeland rehabilitation. In the process of improving the quality and quantity of forage output in the developed rangelands, it made sense also to focus on improving sheep breeds and animal health to maximize livestock productivity. An important aspect of this component was the preservation and development of the Awassi breed of sheep through the creation of a network of Awassi sheep breeders. Awassi is a local breed and as such is well adapted to local conditions, providing meat and milk of excellent quality. The movement of flocks over time has favoured crossbreeding and weakened the adaptive powers of the Awassi breed.

The project invested in specialized breeding and research laboratories for the improved selection of Awassi rams, which are sold to breeders to be partnered with selected ewes. The project sold the improved rams to herders at subsidized prices and provided credit to network members to facilitate this investment. Male offspring was then sold on to other communities in a revolving livestock scheme. In addition to other animal husbandry techniques, breeders have learned about genetic management of stocks – how to select and breed – and the importance of registering stock. The Awassi Sheep Network initiative is a significant step forward in improving and preserving one of the most important small ruminant breeds in Syria.

The 2,241 rams selected and distributed (of which 1,186 were provided to members of the Awassi Sheep Network) have contributed to improving the prolificacy of the breed in the Badia area and resulted in higher milk and meat productivity.

The veterinary programme was jointly implemented by the BRDP and the Ministry of Agriculture. All cooperative members participating in project implementation and members of the network were attended by mobile veterinary units, and were provided with tools and equipment for weighing and measuring animals. They also received sponge hormones (PMSG)⁷ to increase the fertility of ewes at subsidized cost and allow livestock owners to synchronize mating and birthing times.

The activities of the Awassi Sheep Network have brought an average 6 per cent increase in lambs born and 3.4 per cent increase in the number of twin births. Abortion and mortality rates are similar to those outside the network. Members interviewed estimated their income increase to be about 30 per cent. The improved breed gave an average increase in milk production of 4.7 kg per ewe per season. Scientists at the El Kreim Research Centre maintain that there is still a large margin of improvement to be obtained from these breeds. It is expected that these outcomes will be scaled up by the new Integrated Livestock Development Project.

The Awassi Sheep Network achieved some impressive results, if on a limited scale, and can be considered a pilot activity, which is to be further developed under the Integrated Livestock Development Project. The network now consists of 79 herders owning a total of 6,009 tagged ewes (less than one thousandth of the national flock). The impact of individual elements of the livestock development component has yet to be assessed.

The processing and marketing of livestock products such as milk and cheese were not developed within this project. The achievements of the livestock development component would have been greater if the recommended improved processing technologies had been included in livestock development activities.

7/ Pregnant mare serum gonadotrophin.

Box 4 Women as providers

Samira Hassan is from Shaddade village in Hassekeh province. She is 25 years old, married with two boys. "Growing up I travelled with my father and brothers in the grazing season and helped with the milking," she says. "I only had five years of schooling, up to the age of 11. Our conditions were bad and my father was sick. We had to help with the herding. I first started with the project as a seasonal worker. I was so happy to get my first salary, I felt important and independent, I was able to help my father. Later I took health care and food processing courses. Now I'm a trainer and earn SYP 100 (about US\$2) a day."

"We're very happy and live comfortably now. Without the project I'd probably be working as a labourer or herder. My husband might be working in Lebanon or another country. I wasn't able to go to school but I want my children to be educated and have job opportunities."

Box 5 The benefits of better breeds

Ahmed Suleyman, 63 years old, is head of the sheep-breeding network in Naif Tel Azem, Aleppo province. He has 300 head of sheep. In 2003 the project informed him that they were establishing a breeding network in his locality, and he registered as a member. The network received improved rams and measuring tools to weigh animals and milk, in addition to fences to make pens for the sheep. At the time of insemination the project gave them hormones to boost the fertility of the ewes. "The production of meat and milk has improved," he says. "Before we bred lambs for four months and sold them at 45 kg, now they are reaching 50 kg at the same age. The rate of twins has gone up, and we are able to coordinate the birthing period and selling. This makes things easier in terms of reliance on services – we can call the vet at the same time."

In Suemira, in Dara'a province, the local cooperative agreed to join the Awassi sheep network, but not to collaborate with rangeland rehabilitation, because they could not agree to commit to rehabilitation. "The improved breed has been a success," says Awad Ali Suemer, deputy head of the cooperative. "We get a better price for the sheep with early lambing, and milk production is higher. The number of twins has increased with hormone use from 5 to 25 per cent of the flock. In a drought year we sell some of the lambs and keep some, now that the ewes give birth twice a year. In a good year with the improved breed we can save about SYP 2 million (US\$43,406), through savings on supplementary feed, sale of milk, meat and wool produced from healthy herds."

IV. Conclusions and lessons learned

Project achievements overall

The BRDP has demonstrated that the participatory approach can be successfully applied in the development and management of natural resources on a large scale, and that the rehabilitation of natural resources using simple and inexpensive technologies is possible even under harsh environmental conditions. The project's impact was negatively affected by a series of severe drought sequences from its inception, and particularly between 2005 and 2008, yet it amply demonstrated that the development of natural rangeland resources significantly helped ecosystems and local communities cope with climate change.

The overall project achievements, especially in terms of rangeland rehabilitation, exceeded stated objectives. Rangeland development reached about 109.3 per cent of targeted objectives by the end of the third quarter of 2010, with a total of about 1.3 million ha of well-developed rangelands scattered over 210 different sites. The developed rangelands now accommodate more than 4 million head of livestock, which are ingesting 60 to 70 per cent of their energy requirements from the rehabilitated sites.

The project improved the incomes of 27,000 families in the Badia and helped them settle to a greater extent. The economic benefits of rangeland development are perceived by the herders in terms of monetary savings on supplementary feed that were made possible by the greater availability of grazing material. The average saving is estimated at SYP 928 per head per year (varying between SYP 1,152 and SYP 570 per head per year) when compared with outlay on feed by herders outside the project target area. The average net income per season was SYP 98,635 per household. In other words, grazing on developed rangeland sites over a period of 58 days allowed a saving of SYP 928 per head. About 60 per cent of beneficiaries interviewed confirmed that their income had increased by an average of 60 per cent as a result of project activities.

The BRDP is the first example of participatory rangeland development in Syria that encourages a sense of ownership and responsibility for natural resources and, in doing so, reduces the uncontrolled competition that leads to degradation. The participatory approach has led to better relationships among members of the same community and between different communities as they work towards the common goal of achieving balanced resource management. No conflicts over resource utilization were recorded during the ten years of the project's life.

The project showed that adoption of the participatory approach is possible even with communities whose members have long been reliant on top-down decision-making concerning the management of their resources. In fact, by project close, a new mentality was coming into being. Some cooperatives had chosen to leave other parts of their land to regenerate. One cooperative had decided to apportion part of the available grazing for hay-making – a common practice in North African countries in which grazing is restricted in order to cut and store dry fodder for summer and winter months.

Management of the developed sites is still in the early stages and will be improved and modified over time. Beneficiary groups now apply and adapt what they have learned from the project technical team in the elaboration of appropriate management plans and evaluation of the physiological stages of livestock and their specific energy and nutritional requirements.

One of the most encouraging results at project close was the willingness of the beneficiaries to protect their developed rangelands and rehabilitate additional sites through resting and reseeding. Many beneficiaries said they intended to collect seeds from the sites already developed by the project. Some even asserted that there was no need for mechanical scarification when

Box 6 Project benefits

"How did we manage before the project?" Saleh Al-Helal from Hwaiat al Debe, Hama province explains; "There was virtually no vegetation left. We went to the east to graze, and worked as labourers to supplement our income. The project opened in our area in 2000. We hesitated at first. But the green cover is increasing. I had 50 sheep, now I have 600. I have a tractor which I paid for using a loan through the project. We've felt the drought less. Those outside the project have had to transport their sheep east to the Iraqi border, at a cost of about SYP 10,000 (about US\$217) per herd of about 200 sheep. Or they resort to emergency selling – losing from 50 to 75 per cent of their flock."

Box 7 From passive to autonomous

In Zimla and Deir Ezzor, herders anxious to continue rehabilitating their rangelands have introduced their own innovations for reseeding by using their herds to scarify or break up the ground with their hooves and thus bury the scattered seed. Ghannam H'sine El H'sine (*Mokhtar* or Mayor of Shola) in Deir Ezzor province acknowledges that the developed rangelands have reduced herders' dependency on bought feedstuffs and lessened the frequency and length of migrations through the Badia and to other settlement zones. "We will use all the means in our power to protect our developed rangelands," he says. "We will organize ourselves to guard the newly rehabilitated rangeland sites, and we plan to develop additional sites by reseeding; all we need to do is collect seeds from the sites that have already been reseeded and planted within our rangelands. We don't need tractors or scarifying equipment to reseed; all we need is to sow the seeds by hand on the ground and let our animals walk over the area."

reseeding, since it was enough to spread the seeds on the topsoil and let the animals' hoof action bury the seeds. This is a great achievement and a strong demonstration of the fact that beneficiaries are thinking creatively about management and no longer waiting passively for instructions or help.

Replication and scaling up in Syria and elsewhere

Application of the technical packages for the development and rehabilitation of the plant cover and increase in forage achieved by BRDP could be expanded across the remaining areas of the Badia and into a large part of the marginal settlement zone 4. In fact these technologies can and should now be expanded to additional areas. Use of the same techniques already applied in 30 per cent of the Badia could be extended to at least 20 per cent of the remaining 7 million ha of the Badia.

This must be done in order to: (i) halt degradation of the rangelands; (ii) adapt to the effects of climate change; (iii) withstand the rising prices of feedstuffs; and (iv) sustain the extensive livestock industry within profitable and viable economic parameters. Expansion throughout the remainder of the Badia is also necessary to avoid conflict between those benefiting from the rehabilitated areas and those excluded, who must continue to eke out a living in the degraded areas. Expansion is also needed to: (i) improve and maintain the new infrastructure, such as seed production units, nurseries and water points; (ii) make full use of the skilled technical staff of the BRDP who have been trained in rangeland development techniques and can also train other technicians in this field; and (iii) utilize the database and Geographic Information System centre, which allows better synchronization and more accurate monitoring and evaluation of additional natural resource development and management programmes.

The scaling up of project achievements at the national level is being carried out jointly by IFAD and the Government of Syria. All IFAD-supported projects in Syria continue to be implemented using national financial resources. In this way BRDP activities will be expanded to other sites in the Badia and in the marginal settlement areas in zone 4. In addition, the technical packages (slightly modified, where needed) are to be expanded over some 0.5 million ha of rangeland in the Badia and, through the new Integrated Livestock Development Project, trialled in settlement zone 4.

The same approach and techniques as those used under the BRDP will be applied. First, homogeneous communities with promising rangelands for development, protection and management will be identified. The success and sustainability of any rangeland development activities requires the simultaneous organization of the geographical area, the social dimension and the institutional framework.

It may be necessary for the Ministry of Agriculture to invite the GUF to reinforce its collaboration and to facilitate the participation of the Bedouin herders in the protection, development and management of their own rangelands resources.

- (a) The cropping of salt-tolerant forage species in collaboration with the International Center for Biosaline Agriculture was not carried out under the BRDP but would add greater value to the rangelands.
- (b) Areas that remain to be fully developed are the more productive rangelands covering about 7,000 ha located in regularly flooded depressions.
- (c) The technical packages could be usefully modified and adapted to the environmental specificities of some sites. Sites that have rocky soils could be reseeded without the use of mechanical soil scarification, e.g. by spreading seeds on the top of soils, or through scarification of soil strips between planted rows of fodder shrubs, which may help seeds to germinate and develop.
- (d) The *sandouqs*, or revolving funds, need to be strengthened and expanded across the project area and beyond. Ideally, each cooperative creates and operates its own *sandouq*, with the support of the project management unit and the Ministry of Agriculture. Through many other (IFAD funded) programmes, Syria has now accumulated solid experience in the management of *sandouqs*.

A legal framework for sustainability

Certain policy and legal frameworks are needed to support the participatory approach. The prerequisites for sustainability are in place, but herders need greater security of tenure: they need a guarantee that if they work together to manage the rangelands they will be granted protection and exclusive use of their resources. The necessary institutional and legislative framework needs to be elaborated and enforced by the Government to ensure that the participatory approach can be sustained. Ideally, a long-term policy should be drawn up by the Ministry of Agriculture concerning the granting of exclusive rights of use or renting for periods of a reasonable length (at least 40 years and preferably up to 99 years) to communities willing to develop, properly manage and protect their rangelands. Any return to common and free grazing of rangelands is to be avoided.

Overall coherent intent is needed on the part of the Ministry of Agriculture and the Government, with emphasis being placed on the importance and role of the rangelands and extensive livestock production systems within the national long-term strategy. Policies, laws and decrees need to be adapted and enforced to develop rangeland resources in collaboration with the communities. Herding communities also require institutional support from the GUF. The GUF played a positive role in the early stages of the BRDP by providing willing cooperatives with authorizations to develop their rangelands, but in the last two years of project life declined to collaborate and withheld authorizations to new cooperatives wishing to join the project. This situation, if not resolved, will create a growing divide among communities and prevent further rangeland areas from being developed through the participatory approach.

Until the GUF gives all communities living in the Badia its authorization to delimit and develop the rangelands, the participatory approach will be unworkable even for those wishing to adopt it. The present situation creates increasing disparities between project beneficiaries and other communities. The BRDP outcomes would have been far more substantial had the GUF collaborated with the project.

Synchronization of partnership

The BRDP is not the only operator in the Badia. Several other players, such as the former Badia Directorate, the newly created Badia Authority, ACSAD, FAO, ICARDA, UNDP and

World Food Programme, have been or are involved to a greater or lesser degree in the development of rangeland resources in the Badia. It is important that the country benefit from this range of experiences and funding sources, but the different approaches and methodologies adopted by many of the players often are in contradiction with one another. If these bodies do not act in partnership, this diversity could constitute a limiting factor in the scaling up of successful outcomes and approaches. The BRDP approach and technical packages should be adopted by all stakeholders operating in the Badia, as established and enforced by the Ministry of Agriculture.

To facilitate scaling up in Syria, collaboration with several national, regional and international institutions, such as ACSAD, ICARDA, the International Center for Biosaline Agriculture and national agricultural and scientific research authorities, would help enhance the technical packages and facilitate expansion.

Replication elsewhere

Simple and cheap technical packages, if properly applied, can bring relatively rapid healing to rangeland ecosystems and provide a substantial improvement in the availability and quality of forage on offer. In most cases, developed rangeland sites can be grazed from the end of the second year.

The technical success of the project in participatory rangeland development and management now offers a meaningful reference at the local, regional and international levels. Many technicians and programme leaders from North African, Middle Eastern and Asian countries (China, Jordan, Morocco, Oman, Qatar, Saudi Arabia, Sudan, Tunisia and Yemen) have visited the project and witnessed its achievements. The project approach and activities are now widely known abroad.

The long-term sustainability of rehabilitation is dependent on the broad application of a participatory approach in which well-defined communities become actors and decision makers in the development of the resources they rely on.

Reseeding and resting of rangelands are now well-mastered techniques that can be expanded over a wide area of rangeland. Technologies should be adapted to the environmental specificities of each site. The selection of sites should favour those that show evident signs of vegetation regeneration and have soils that show potential for improvements in water and organic matter balance. It is possible to scale up reseeded techniques and set up large-scale seed production units. In areas or countries where seeds are not available, seed production units need to be established first. Priority should be given to native species of high-value forage.

On the practical side, large areas of rangeland can be rested without fencing, but guards need to be recruited during the first two years of implementation, in other words before the first developed sites are utilized. Once participatory management is in place, the presence of beneficiaries on the land plays an important role in protecting them. Resting can be scaled up provided the land is protected from intruders.

Planting of fodder shrubs is an efficient means of rehabilitating badly degraded areas, but requires specific measures that need to be handled by a dedicated programme or included within government policy. This mainly concerns seedling production and transportation, and planting, watering, soil preparation and protection, which sometimes requires the use of specific equipment and expertise for which the communities alone cannot be expected to be responsible. Ideally, a Government-funded project provides seedlings, prepares the soil, supervises planting and ensures necessary watering, while communities ensure protection and appropriate management and provide labour. As in the case of the BRDP, labourers should be remunerated for their work. In this way the planting of fodder shrubs can be scaled up, but the conditions for implementation should be planned and well established beforehand.

The basic approach to the management and utilization of developed sites can be adopted on a large scale by many communities and technical staff. It consists of:

- (i) Assessing and evaluating the forage production at each developed site prior to the grazing period (an assessment for each grazing period is necessary, the carrying capacity is then calculated on the basis of available edible biomass).

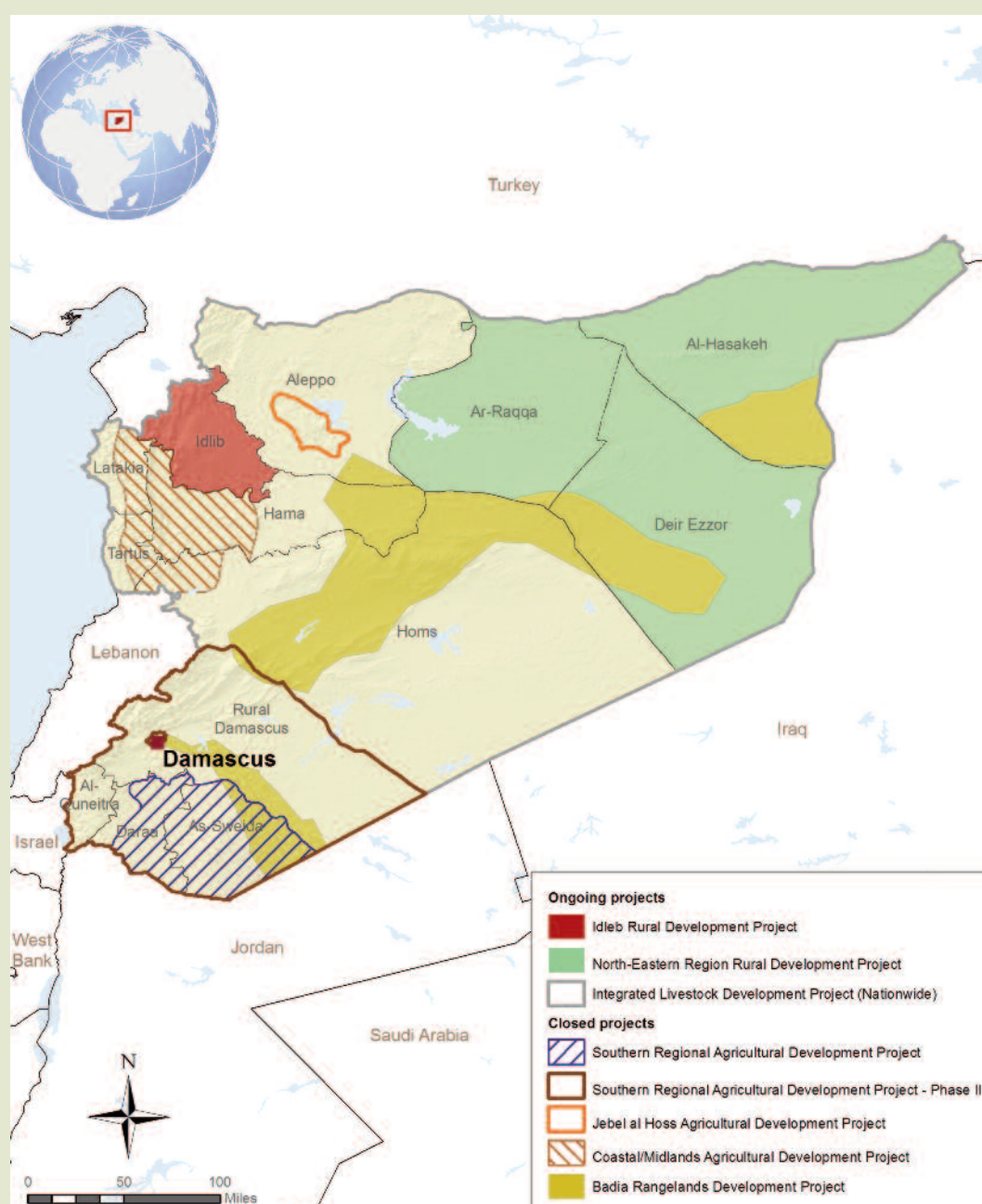
- (ii) Calculating the stocking rate and duration of the grazing period on the basis of available feed resources and taking into consideration the physiological stages of the main high-value forage plants.
- (iii) The herders then coordinate with their rangeland management committee to determine grazing permits and the number of animals each herder would introduce. The collection of grazing fees and the modalities for contributing to the protection of the rangelands are left to the discretion of the community.

It is particularly advantageous to combine natural resource management with other social development components and to develop extensive livestock systems alongside improved fodder production. Social development promotes the empowerment of local communities and allows them to appropriate technical packages. This constitutes a fundamental basis for replication and for the sustainable management of rangeland resources.

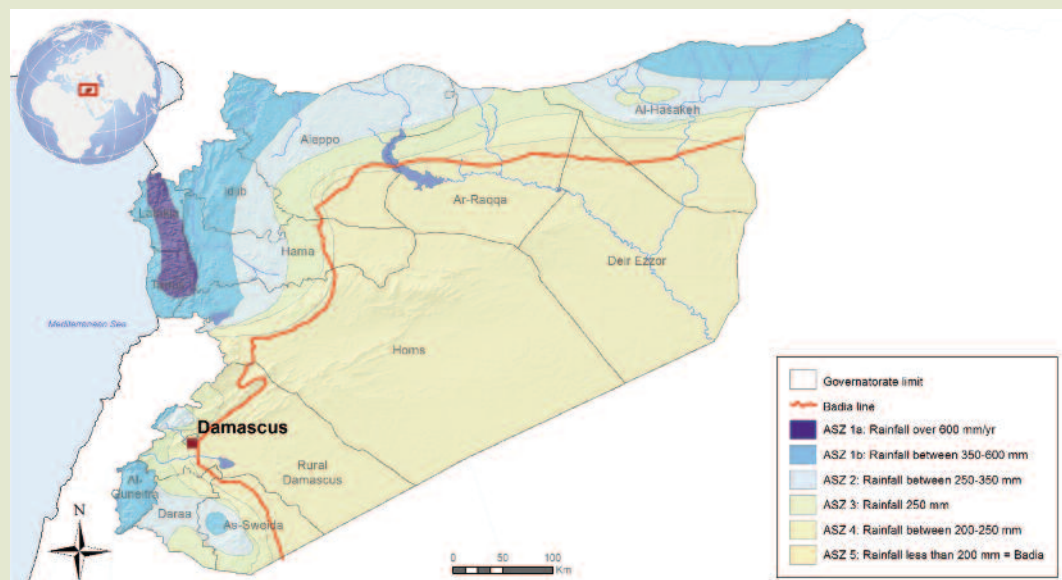
Appendix 1

Thematic maps

MAP 1 Administrative map - governorates and IFAD-funded operations

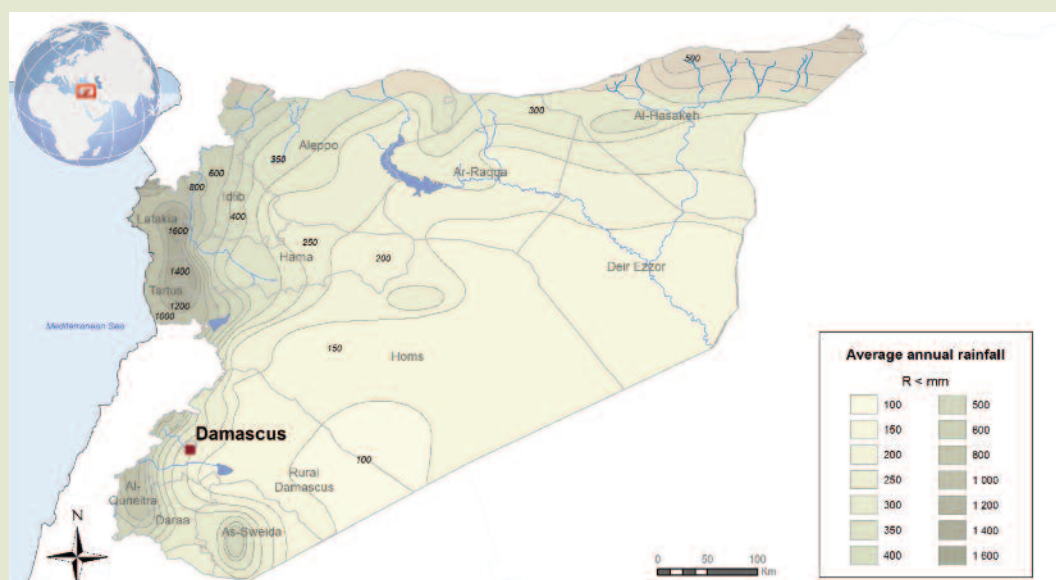


MAP 2 Agricultural settlement zones (ASZs)



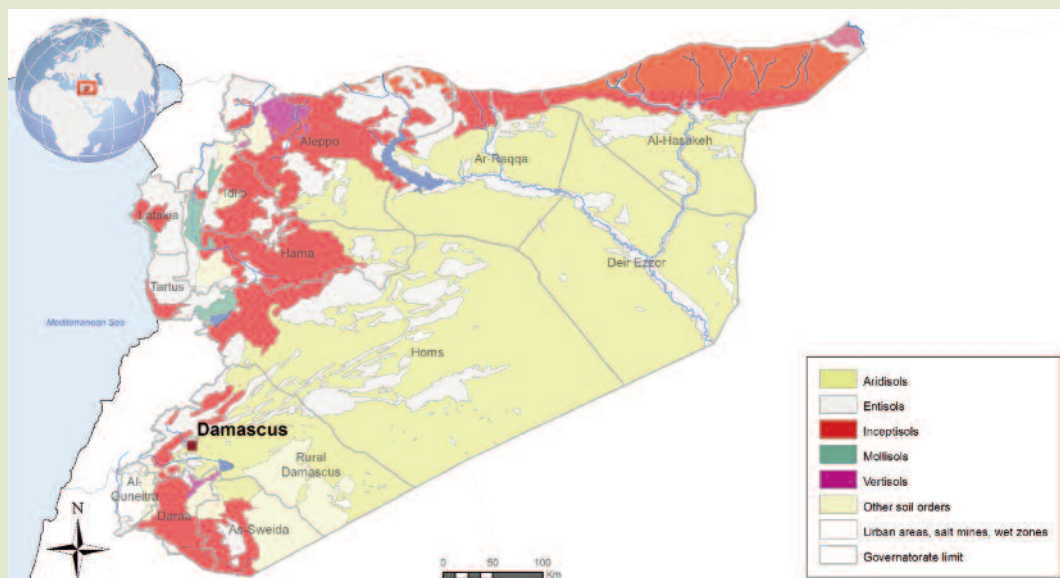
Source: MAAR/GCSAR-2006

MAP 3 Rainfall distribution



Source: MAAR/GCSAR-2006

MAP 4 Soils type distribution (published at 1:500,000 GCSAR-Damascus)



Source: MAAR/GCSAR-2006

Appendix 2

Photos



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Milking sheep in the Deir Ezzor governorate



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Shrubs are planted within a small depression to collect rainwater and ensure the plant is well irrigated



© IFAD/Nabil Mahani

Rested areas revert to healthy ecosystems



© IFAD/Nabil Mahani

The presence of *Stipa Lagascae* – a tall grassy plant – is a sign of complete rangeland regeneration



©IFAD/Sarah Morgan

Seed produced by the project is stored in Hama province



©IFAD/Sarah Morgan

A nursery set up by the project in Shedade, Hassekeh province



Women from local communities are employed by the project in the nurseries



Improved grazing sites ensure quality feed for longer periods



©IFAD/Nabil Mahaini

The *Jabban*, or itinerant cheese maker, visits the Bedouin communities and processes their milk



©IFAD/Nabil Mahaini

Dairy products made from quality sheep milk in Salamiya, near Hama

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