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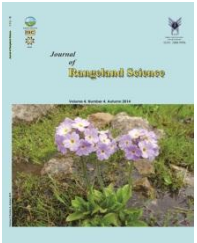

Review and Full Length Article:

Evaluation of Alternative Livelihoods Status in Arid and Semiarid Regions of Iran to Improve Sustainability

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Abstract. From the perspectives of many environmental and conservative policy makers, improving and diversifying the livelihoods have been found as a mechanism to promote the livelihoods and persuade people to avoid the overexploitation and degradation of natural resources. Due to the fragility of the environment and inconsistency of incomes, the alternative income sources may be promised to warrant inhabitant's earnings. The noticeable example for this is arid and desert area in central and eastern Iran. This paper presents the conceptual underpinnings of this method with some examples of how innovative ways for creating livelihoods can help alleviate the pressure on marginal arid lands. Three case studies put forwarded considering activities undertaken within an integrated international project formwork called sustainable management in marginal dry lands. At first, introduction of chicken farming to farmers in Hunshundake Sand land in northern China has minimized pressure on grasslands and led to the restoration of these ecosystems. Secondly, to develop desert-based farming on the edge of Cholistan desert in Pakistan has provided a new income source for rural people. Thirdly, the development of a new income-generating activity in terms of soap production from olive in Dana Biosphere Reserve in Jordan has proved that traditional olive farming can be associated with community-based initiatives to create a market for goods and commodities. Also the conditions for introduction of similar alternative approaches to Iran are evaluated through evaluating existing socioeconomic and climatic backgrounds. Collaboration with communities for creating new and sustainable ways to reduce pressure on the land in arid and marginal desert areas can be a powerful tool to overcome poverty and struggle desertification and its resiliency.

Key words: Ecological sustainability, Arid areas, Alternative livelihood

Introduction

Climate changes and overexploitation on rangeland and agricultural land, especially in arid and consequent imbalance between supply and demand benefits and ecosystem services all together have endangered such ecosystems and livelihoods and local people's income (Adeel *et al.,* 2005). This process occurs in arid regions of all continents imposed serious consequences of social, economic and environmental ecosystem and dry lands inhabitants (Safriel and Adeel, 2005). For this, it can be said that population growth and unwise policies and some aspects of globalization and industrialization have great deal of contributions to the unsustainable stresses imposed on the arid areas. A global evaluation report on desertification developed by the millennium ecosystem assessment (MA) has helped us to better understanding of the nature and impacts of desertification (Adeel *et al.,* 2005). The MA report has determined that growing the desertification in dry lands which occupy over 41% of the world's land area and are home for over 2 billion people threatens the homes and livelihoods of millions of poor. Considering the above reports, such catastrophes severity may be alleviated through adopting integrated management approaches. However, this may cause some challenges due to the increased competition, while imposing risks on the desertification sustainability threshold. These impacts of desertification on dry land populations are further exacerbated by the political marginalization of the poor dry land and the slow growth of health and education infrastructures. On the other hand, stresses on degraded and at-risk lands can be reduced by creating innovative and sustainable livelihood options for dry land populations. These alternative livelihoods like solar energy production (Faiman, 1998) ecotourism (Warren, 2006) and brackish-water aquaculture, to encourage people to diversify their livestock and rangeland products (using wools to produce fibers, yarn and subsequently to promote homemade industries) take advantage of the unique dry land attributes (Kolkovsky *et al.,* 2003). By definition, an alternative dry land livelihood has minimal dependence on land primary productivity, yet it typically generates greater income per investment of local dry land resources and diversifies local economies, as compared to the traditional, biological productivity-dependent livelihood (Mendez, 1993). A common feature of alternative livelihoods is that their viability requires capital investment and trade-related infrastructure, which in turn depend on enabling policies and effective governance. These attributes are also instrumental or an effective implementation of innovations for attaining sustainability of livelihoods based on land productivity. Such qualities are often deficient in many dry land countries (Belal and Irina, 1996). Therefore, the first step to be taken on the path to dry land sustainable development is to invest in social, political and governmental changes while building capacity and creating a capable environment that can support the innovations. This would pave the way for emerging alternative livelihoods.

History of sustainable livelihoods framework dates back to the 1980's while developing a social applied research method called Participatory Rural Appraisal (PRA) by Robert (1983). This design has acquired much popularity by international NGOs (Robert, 1983). In a gradual introduction of alternative livelihoods, income enhancements as a result of their side-by-side implementation with improved land management can create the positive feedback loop. When the alternative livelihoods start to yield income, two trajectories may be available: gradual substitution of the traditional livelihoods; or part of the income generated by the

alternative livelihood is re-invested in land-based livelihood, so that coexistence of both approaches can be retained (Fig. 1). Such coexistence of both tracks can offer a buffer against climatic variations and economic shocks with respect to the conferring of stability and sustainability to the rural dry land livelihoods.

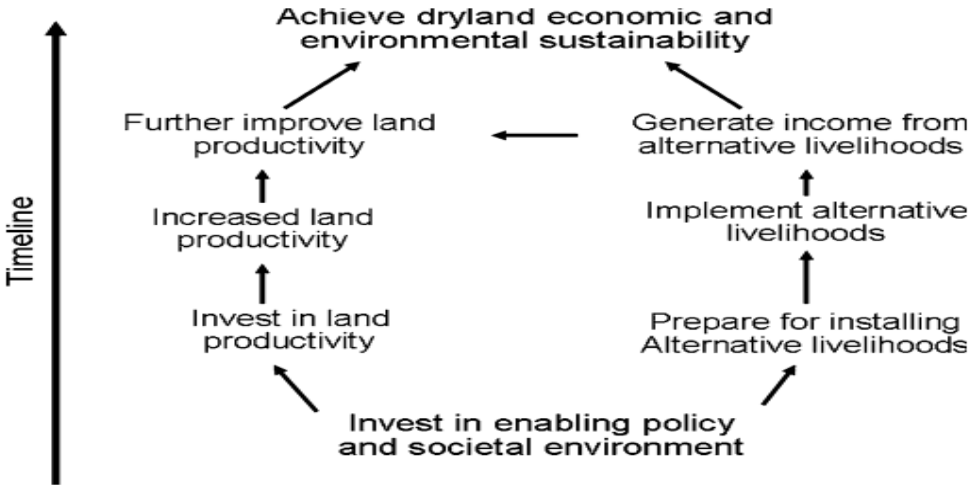

Fig. 1. The proposed approach for attaining sustainability in the dry lands, through introducing alternative livelihoods (UNCCD, 2005)

Iran's arid central region is not excluded from income loss and vulnerable to climate fluctuations. In addition to low productivity in arid areas, following the global trend of increasing socio-economic progress the population in many arid regions was increased in comparison with other ecosystems. At the same time, arid areas residents have used basic resources to promote lifestyle and reach to high standard faster than its substitution, in turn leading to less per capita production and finally poverty. Globally such measures vary from territorial plans based on adaptive knowledge activities with financial assets and technology to use low-tech and relatively expensive ones (Belal and Irina, 1996). Operations using expensive technologies and advanced new features to increase the production of better and sustainable livelihoods in dry areas also create greater prosperity for the region. However, there is clear evidence of successful used adaptive technologies, and sometimes, cases of failure have been appeared. These failures are often stemmed from the successes and triumphs exposed to public view and it is observed as a common belief that many measures are based on prescriptive territorial planning which did not give desirable results and failed to alleviate poverty or even increased it. As a whole, there was no territorial planning based measure and in the processes, observations and surveys were generally subjected to political, social, economic and ethnic perspectives. Therefore, implementation of prescribed measures and technologies did not welcome by locals and soil and water resources stakeholders. It can be said that in most areas of the country still there are economic opportunities that allow them to improve the arid land-based livelihood (poverty eradication), provided that using new technology-based improvements are in line and harmony with the fundamental principles of political and social ambient (CENESTA, 2002).

In case of meeting the social and political constraints in arid areas, as long as resources are not overexploited exceed their capacity, to apply new technologies can be effective. It should be noted that

there is no sustainable technology to increase productivity in arid lands beyond the inherent capacity of that. Thus, where there is a limited ability to generate sustainable land and elsewhere, it is prone to overexploitation due to population growth, productivity will be low while exposing lands to the desertification and as a result, poverty. Once the arid area's productivity potential is used up completely, welfare maintenance will be achieved when additional income source is obtained through creating alternative jobs independent from land productivity. This alternative employment will not impose additional pressure on land resources, and thus increase the revenue being generated without damage to basic resources and therefore do not cause desertification (Chichilnisky and Heal, 1998). However, this path "alternative livelihoods" requires investments in both physical infrastructure and human capacity and a policy support and good social ambient is essential for the successful implementation. Such an environment is useful for improving sustainable land production. Thus, it is essential to invest in a social, political and economic supportive as soon as possible; otherwise, growth in turn disrupts the sustainability. The most promising route to alleviate poverty and achieving sustainability and sustainable production in arid rural is to adopt both ways simultaneously. It means that the adoption of measures is more likely to improve and increase sustainable production and resource bases in order to take an initiative for developing the independent alternative livelihood as well as sustainable land productivity. The main purpose of this paper is to propose a model for the introduction of alternative livelihoods in order to achieve ecological sustainability, while sustaining nomads and farmers and ranchers and rural livelihoods (subsistence) in arid and semi-arid areas of Iran (CENESTA, 2002).

Some key alternative livelihood approaches of dry land forestation and carbon sequestration

This livelihood is completely dependent on the dry land biological productivity, but instead of producing subsistence crops it generates marketable fuel wood, biofuel, and sequestered carbon. Firewood supply from reforestation areas is projected to grow three- to fourfold by 2020 (Shvidenko *et al.*, 2005), and an increasing demand for it, is expected in the dry lands, driven by the high population growth rate, coincidental with an increasing decline of firewood provision by dry land ecosystems (Sauerhaft *et al.*, 1998). The increased public awareness of global warming and a better-recognized the need to diversify and increase renewable energy sources (Sampson, 2005) and draws attention to the option of using the dry lands for biomass production (Foran, 2001). The emerging carbon trading under the clean development mechanism (CDM) of the Kyoto Protocol can add value to dry land forestation for carbon sequestration in addition to its economic value in providing firewood and renewable biomass (Chichilnisky and Heal, 1998). Though trees, like dry land crops, are constrained by water, afforestation in the least and medium dry lands subsist on local rain better than many dry land crops, provided the rainfall is concentrated using simple runoff harvesting practices. On the other hand, there are cases where dry land forestation depletes local water resources (Carrere and Lohmann, 1996). Therefore, promotion of scientific forestry and native species adapted to arid and semi-arid may be promising to wood production and carbon sequestration in Iran as well as promoting livelihood.

Controlled-environment dry land farming

This livelihood entirely depends on biological productivity, yet it is mostly and often totally detached from the local

land resources. It is based on the plastic-covered greenhouse that allows the penetration of the abundant light radiation of the dry lands, yet provides a fully controlled, automated and enclosed environment (Jensen and Malter, 1995). Originally designed for non-dry land areas for increasing the internal temperature during cold seasons, greenhouses with the dry land controlled environment improve water consumption efficiency of the crops through reducing the evaporative losses (Arbel *et al.*, 1990). The caveat for this approach is the high investment in infrastructure, research and maintenance, as well as dependence on high-quality water supply in arid areas of Iran. Such capital investment can be justified in a developed country on the basis of high returns on the investment through exploitation of the market for seasonal and/or ‘‘organically grown’’ products (Jensen and Malter, 1995).

Dry land aquaculture

This is an emerging dry land alternative livelihood with good potential for addressing the increased global demand for aquatic crops and the degradation of marine fish stocks. Since dry lands are by definition lack of water, they are conventionally not expected to support a livelihood like aquaculture. However, since aquatic organisms live in water but do not transpire it, water use efficiency of aquaculture in dry land areas is relatively high. Additionally, this approach allows the use of brackish groundwater often encountered in dry lands (Kolkovsky *et al.*, 2003). Also, the nutrient-enriched water effluents of aquaculture can supplement the irrigation of crops and reduce fertilizer inputs (King *et al.*, 2002). On the whole, less water is invested in dry land aquaculture than in dry land agriculture and is practiced in both industrial (e.g., Australia (UNCCD, 2005); Israel (Kolkovsky *et al.*, 2003); and the USA (McIntosh *et al.*, 2003) and developing countries (‘‘SUMAMAD (Sustainable Management of Marginal Dry lands)). It not only produces edible fish and crustaceans but also ornamental fish and micro-algae that bio-manufacture invaluable chemicals used in the health and food industry (Warren, 2006). The drawbacks of dry land aquaculture include the lack of awareness and know-how about the relevant technologies, and often the lack of infrastructure needed for storing, shipping, distributing and marketing the end-product. There are also potential competitions of water consumption and sea animals for the agricultural activities and meals to feed the livestock. It can be argued that once measures to reduce the dependence on fishmeal are developed and adopted, and dry land coastal aquaculture using seawater is avoided, dry land aquaculture has the potential to emerge as a fully sustainable dry land livelihood.

Ecotourism in dry lands

Dry land tourism is driven by the increasing affluence and free time coupled with a growing demand for non-congested, non-polluted, pastoral, and pristine landscapes that many dry lands provide especially deserts. A large segment of the tourist population, however, does not compromise on comforts and other leisure-time amenities, which requires a careful evaluation of the ecological footprint and perhaps a reliance on nearby urban centers. Dry land ecotourism may thus be viewed as an urban-supported alternative livelihood that can be adopted by both rural and urban dry land people. The main drawback of this livelihood is its high water demand, which can be met by desalination and treatment of marginal water resources including urban wastewater. To maintain its sustainability, measures need to be taken to prevent dry land ecotourism from damaging the assets on which it depends, for example through interferences with wildlife and indigenous cultures (UNCCD, 2005).

Solar energy in dry lands

Dry lands have a high potential to generate solar energy, and perhaps export some of that energy to non-dry land markets. In particular, deserts are likely to be competitive in solar energy generation, due to high solar radiation, low cloudiness, and cheaply available spaces (Faiman *et al.,* 2002). It can be argued that to minimize capital investment, only desert margins are the appropriate venue for solar power generation for export, whereas stations for local uses could be placed on other dry land sites. In both cases, the solar "farms" of photovoltaic panels or mirrors require much space, and hence are likely to be placed in rural areas. The revenue from this approach augments the income of rural populations, whereas the administrative, marketing and technical backstopping would likely reside in urban centers.

Case studies demonstrating alternative livelihoods Chicken farming in Hunshundak Sand land, China

The Hunshundak Sandland is situated in Inner Mongolia, where significant depletion of the natural grasslands has been observed over recent years (SUMAMAD, 2004). Scientists working at this site concluded that natural restoration techniques—that are removal of external stresses like cattle farming—could help recover the degraded rangelands without pro-active vegetation restoration activities. To achieve this purpose, the local villagers were offered alternatives for income generation, through milk and tofu product processing, ecotourism and raising chickens, instead of livestock production. The researchers from the Chinese Academy of Sciences involved in the project studied the economic and ecological efficiency of chicken farming, based on the input and output of local businesses, as well as the potential impacts on forage and animal production. Questionnaires were sent out to the local people and then collected by the research team. Of the 50 questionnaires, 41 completed forms were received and 10 households were randomly interviewed for a more detailed analysis. Some 15,000 free-ranging chickens have been raised in 26.6 ha of the grassland in Bayinhushu Gacha (village) of Hunshandake project site. The primary beneficiaries of this activity are the local people, many of whom had taken up chicken farming. There are some nominal losses (ca. 1,000 Sustain (Adeel and Safriel, 2008); for example, wild animals such as eagles and foxes feed on those chickens even when protection facilities are built. The average market price for a free-ranging, ''naturally grown'' chicken is US$ 5.26. Therefore, an income of 73684$ / year is expected for the five families who run this business. Due to ongoing farming and marketing process, the exact amount of profit has not been estimated. However, each family is estimated to earn at least US$ 7,900 which is much higher than what they earned in raising cattle (US$ 1973 /family).

Aquaculture in Pakistan

Cholistan is a vast sandy desert (average rainfall 160 mm) in Eastern Pakistan, spread over about 26,000 km^2 (Kolkovsky *et al.,* 2003). In the Cholistan region, livestock rearing is traditionally the main source of income for the local inhabitants. Crop-based agriculture is not possible due to non-availability of irrigation water, hyper-arid climate and topography. This leads to overall poverty and poor living standards, mainly due to lack of diversity in the sources of income. The primary source of water in Cholistan dry lands is runoff generated from infrequent rainfall, which is used to meet water requirements of both humans and livestock. Rainwater is collected in natural depressions or man-made ponds, locally called 'tobas', during the rainy season. These tobas are not mostly located in appropriate places, because the

sites are identified without taking topography into consideration. As a result, water is lost rapidly and is available only for 3–4 months a year. The alternative livelihood project site in Cholistan has been managed by the Pakistan Council of Research in Water Resources (PCRWR). This helped to establish surface-water reservoirs of appropriate depth and at topographically suitable locations. In addition aquaculture some fish species including Tilapia, Grass carp, Common carp, and Silver carp (Moori and Rahu species) species are highly tolerant of brackish water with salinity ranges between 4,000 and 30,000 ppm. This has led to the introduction of fish farming in the marginal dry land location as part of other integrated farming systems; e.g., livestock– fish farming, poultry–fish farm, duck–fish farm, horticulture–fish farm. This improved local people's income, while making optimum use of rain water and alleviated the damage caused solely by livestock production in the fragile ecosystems in arid and semiarid ecosystem.

Olive-based soap production in Jordan

Dana Biosphere Reserve, in Jordan, is a 300 sq km protected area which contains a system of wadis and mountains extending from the top of the Rift Valley down to the desert lowlands of Wadi Araba. At the site, the management approach implemented by the Royal Society for the Conservation of Nature (RSCN) is intended to integrate the conservation of nature with socioeconomic programs including income generation through ecotourism and marketing of olive oil based products (Wallace and Barker, 2003). The main water sources in Dana village are three springs, which are used to irrigate about 40 ha of fruit farms in the traditional orchards surrounding the village Improvements to water and land management were made in the gardens through participatory work with local farmers to renovate the irrigation channels and use stone terraces. In Dana village, and in other villages and towns around the Dana Biosphere Reserve, production of high quality olive oil has been a traditional livelihood, and the olive trees are grown without the use of pesticides and fertilizers. However, the livelihood is not sustainable, because the land-users suffer from many fluctuations in the market and pricing of olive oil. To offset this uncertainty, the community has considered and implemented the production and marketing of olive oil soap. Part of the olive oil produced by local farmers is being used to produce high quality olive oil soap in an *in-situ* workshop. The soap is free of chemicals, and the soap pieces have inscriptions inspired from animals and plants of the region; the marketing of the soap is linked to an ecotourism site on the reserve. Marketing surveys during 2005 and 2006 have enabled the introduction of new herbs and plants as additives to the soap; for example, the prototype soap containing lemon has been found to be very good for skin care. Working with local experts, a new marketing approach has been developed in which visitors to the Dana biosphere reserve can cut their own soap at the production site.

Feasibility of alternative livelihoods in arid and semiarid regions of Iran

Arid lands are characterized by several natural features with potential economic development opportunities often greater than the capacity. Such special features are provided comparatively small in non-arid areas so that people working in the arid areas subjects to better competition than those in non-arid areas. This in turn compensates allow agriculture productivity in arid lands. The main difference is that such potentials are not recognized lycomplete in dry lands however non arid lands farming potential are cognized and exploited already. The most important of these features are

extensive and continuous supply of sunshine and plenty of bare space in dry land without any conflict. Such attributes help development of solar energy, integrated fish and agriculture farming, ecotourism and reforestation economic opportunities in rural areas, and thus provide an alternative livelihood in rural areas of dry land. The above options, with the prospect of biological and mining, however, have been done before in small-scale, but still have not achieved their full potential. That is just one reason why relatively strategic options have been promising. Identification of alternative livelihood opportunities for large-scale facilities such as land productivity is still based on the traditional livelihoods and depends on an extension of enabling social and political context. When it is in place, the economic possibilities of the development pathways to traditional alternative subsistence must be executed simultaneously in land-based and non-land based manner. In addition, when alternative livelihoods are substituted, part of the income generated by them can be reinvested in the further development of livelihood opportunities and strengthening the foundations of development and infrastructure investment.

Utilization of solar energy

Until recently, solar energy production in plants has received little attention by energy producers, so that speak on the development and utilization of solar energy, especially in a country like Iran as source of fossil fuels has been faced too much ignorance. But due to fuel price increases on the one hand and the international community's attention to a serious reduction in pollutant fuel consumption, on the other, it can be expected that in the near future-given ever-increasing role of solar energy in the global energy for economic, environmental and security reasons governments are compelled to separate count on taking advantage of the power source. Iran's arid lands are broad enough, yet a large part of them are exposed to sunlight. Thus, the system can easily be practiced centralizing the light in them. In other words, in dry land the efficiency of solar energy increases with increasing aridity. It is a challenge that might become to an opportunity in a wise manner. In particular, in most areas of desert and arid areas, there are no significant exceptions, no primarily about those who claim that. According to the conducted studies conducted, about four percent of deserts across the world (arid and too arid) may be undertaken to generate annual solar energy since global energy consumption cost would be significant (Kurokawa, 2003). The economic value of such clean and renewable energy source given the harmful effects of global warming, and reduction of fossil fuel reserves and the need for energy is granted, is a fact that undoubtedly will lead to technologies that improve production, local use and export of solar energy as a commodity produced in dry lands. In addition, the local utilization of solar energy in the dry lands leads to reduce excessive utilization on vegetation for biofuels and its threat to land productivity.

Aquaculture

As we know, the biological production requires two critical elements, namely: water and light. The question is whether the abundance of light, dry lands, can deal with water shortages? Water scarcity in arid regions stems from slow precipitation in turn exacerbated by high potential evapotranspiration. But plants living in water do not transpire. Microscopic algae many of which fraught with nutritional, pharmaceutical and many industrial values capture the light and are effective in the biomass production. When cultured in transparent but anti-evaporation containers they grow to full use of the abundant light from the sun to consistent production of the biomass and at this time their water

demands decreases. Some of tiny species of algae have already been proven suitable for cultivation in the production of chemicals is needed in global markets. Integrated agriculture and fish farming, most recently are common in dry lands so that the income is much more compared to when they undertake separately. So aquaculture in dry land is found to be eco-friendly, sustainable and promising in terms of economic potential. Exploitation of natural fish stocks is close to its exorbitant limit, Global demand for non-aqueous protein is rising and aquaculture has not yet achieved its worth potential.

Ecotourism

Increasingly Passion and enthusiasm, especially in crowded urban to use Clean landscape and interest in the intellectual capital, cultural, historical and unique beauty of the dry lands have provided high employment capacity in these areas. Given that tourism is an important economic factor and has the largest employer in many developing countries, in fact, it can be a valuable economic opportunity and advantage to increase the per capita income of rural residents and surrounding areas. Similarly, the attraction of wildlife, biodiversity and visual unique perspectives in dry lands, serve as a most common center of gravity is the growing tourism industry perspective. Because many parts of dry lands are of no forest habitats and dense vegetation, there exist no barriers to study wildlife. For example, Iranian Desert National Park, where visitors can easily see herds of Jabir (Persian gazelle).It increases the value of adjacent rural communities and agricultural land as well as promoting rural livelihoods. Tourist limitations in arid areas, its vulnerability due to local instability and deteriorating security, the cost of travel to remote and isolated as well as bad climate, require energy and a lot of water in residential facilities. An energy issue can be addressed through the construction and architectural solutions for heating and cooling using the solar energy. Water demand already accelerated recovery and utilization, recycling and technologies, wastewater reuse and desalination on dry land. However, it is clear that this area needs more attention and funding by local authorities and events that will be promising through operating tourism and desert tourism National Committee in collaboration with the three organs of Cultural Heritage and Tourism, Agriculture and the Environmental Protection Agency. Biological perspective deals with a higher comparative advantage in the production of bio dry land than to other ecosystems. Although it is accepted that the biodiversity of plant and animal species living in dry lands, is far less than humid and tropical areas, still among the 25 most important biodiversity habitats in the world, eight are located in the dry lands. Dry lands are characterized by two unique increasingly attractive features: First, the origin of at least 30 percent of the world's most important plants are found in dry lands and are ancestors and relatives to food plants worldwide that can be used for further modification. Second, many species in arid lands are used by local people for pharmaceutical and cosmetic purposes or spices purposes. In other words, such xerophytes fraught with metabolites much more than other counterparts in humid climates a fact confirmed by Belal and Springel (1996).

So such perspectives might lead to effective incomes to eradicate rural poverty. This is contingent upon taking appropriate political and social mechanisms to warrant person's income to alternative livelihood.

Extractive industries

Most dry land is rich in non-renewable resources like oil, gas and minerals, metal among many others. Other extractive industries, often in an order of non-

metallic minerals (e.g., sodium sulfate) deposited as solid due to environmental conditions. Despite the relative abundance of extractable resources, mining and extractive industries in arid lands has little contribution to poverty alleviation in rural areas. In addition, current mining methods cause regional environmental degradation leading to the reduced well-being of local people. An example of the mines and catastrophe environmental consequence is Semnan province and Meighan desert in Arak province. Mining and extractive resources in arid lands can be converted into economic opportunities. So that the mining industry is in line with the sustainable development of dry land as the site of financing for rural development and poverty alleviation in arid area. At the same time it should adhere to environmental obligations and regulations of the country, the World Conservation Union and the United Nations Convention to Combat Desertification.

Concluding remarks

The introduction of alternative livelihoods to dry lands, particularly to rural populations, can be an effective tool for poverty reduction. As can be observed from the three case studies, the introduction of such approaches typically diversifies income-generating activities. Such diversity can also be viewed as a main element of increased societal resilience. The example from Inner Mongolia demonstrates that these approaches can also be very effective in restoring degraded dry lands ecosystems when the level of aridity is not extreme as in Iran. However, successful deployment of these alternative livelihoods also introduces a number of new challenges for the communities that require attention, as shown by the case studies. First and foremost amongst these is the societal inertia to abandon a ‘‘trade’’ practiced by communities and individuals for many generations and to explore a totally new avenue. This can be overcome to a large extent by organizing community consultations and selecting options that are preferred by the local people. The success of these options on a pilot scale, for example adoption of chicken farming by one Chinese farmer, also provides tangible proof of success and alleviates anxiety about the use of a new approach. Second, enhancing the technical and managerial capacity of the communities to maintain and operate these new ‘‘businesses’’ require a lot of systematic and planned efforts. Training of villagers in marketing of olive oil products in Jordan has demonstrated good success in confronting with this challenge. Third, building and strengthening of appropriate infrastructure needed for marketing may require investment from governments at various levels to create an enabling environment. For example, preserving, storing and shipping of fish produced from dry land aquaculture would likely require processing and freezing facilities, which may not exist in most dry land communities a priori. Although some climatic constraints and the natural limits cause less potential of arid lands other than their wetter counterparts, however, if the rules governing the ecosystem are well known and understood, appropriate measures appropriate to ecological features of such areas may both warrant sustainability of life and its natural landscapes and improve local person's wellbeing consistent with the unique values of dry lands. The main proof for this is found in numerous countries around the world, the vast majority of them are located in the dry lands, but they are by no means poor; instead countries are nestled in most humid areas, but are extremely poor. In other words, what makes countries and people rich or poor, is not their natural features, but is people attitude and exploitation form on land by which local people take advantages on natural endowments to convert challenges

into opportunities. Highness speaks the words of Douglass North: "Our capitals are not neither in oil wells or banks." If it can properly be recognized and take some steps to their promotion and real wealth of the country, undoubtedly only exceptional attractions of Dashte Kavir and Dashte Loot, may obviate rural reliance on petroleum export revenues.

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ارزیابی معیشت جایگزین در مناطق خشک و نیمه خشک ایران برای بهبود پایداری

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چکیده. بهبود و تنوع معیشتی از نظر بسیاری از سیاست گذاران زیست محیطی و محافظه کاران به عنوان مکانیسمی برای ارتقای توسعه امرار و معاش و تشویق و ترغیب افراد برای اجتناب از بهره برداری مفرط و تخریب منابع طبیعی بوده است. به دلیل شکننده بودن مناطق خشک و عدم ثبات درآمدها، راه-های درآمدی و معیشتی متناوب می‌تواند گامی در جهت تضمین درآمد مردم این نواحی باشد. یکی از این نواحی، شهرهای بیابانی در مرکز و شرق کشور است. این مقاله به ارایه اصول مفهومی این روش با مثال‌هایی در خصوص چگونگی بهره گیری از روش مبتکرانه برای ایجاد معیشت جایگزین برای کاهش فشار بر اراضی حاشیه ای پرداخته است. سه مطالعه موردی ارایه شده است که فعالیت های انجام شده در قالب طرح یکپارچه بین‌المللی موسوم به مدیریت پایدار در اراضی خشک حاشیه ای در نظر می گیرد. ابتدا ترویج پرورش مرغ برای کشاورزان در شنزار هانشوداک در شمال چین که موجب کاهش فشار بر علفزارها شده و منجر به احیای این اکوسیستم‌ها شد، بررسی می‌شود. دوم، کشاورزی بیابان محور در حاشیه بیابان چولستان پاکستان ایجاد یک منبع درآمد جدید برای روستاییان کرده است. سوم، توسعه یک فعالیت شغلی جدید از حیث تولید صابون از زیتون در منطقه حفاظت شده دانا در اردن موجب شده است تا کشت سنتی زیتون تبدیل به منبع درآمدی جدید برای ایجاد بازار های کالا و محصولات کشاورزی شود. هم چنین، شرایط برای معرفی رویکرد های معیشتی جایگزین مشابه در ایران از طریق بررسی شرایط و زمینه‌های اجتماعی، اقتصادی و اقلیمی ارزیابی می شود. همکاری با جوامع برای ایجاد روش‌های معبشتی جدید و پایدار که موجب کاهش فشار روی اراضی خشک و بیابانی حاشیه‌ای می‌شود می تواند یک ابزار قوی برای فقر زدایی و غلبه کردن بر بیابانی شدن و برگشت پذیری روند آن تلقی شود.

کلمات کلیدی: پایداری اکولوژیکی، مناطق خشک، تناوب معیشت