



drynet

www.dry-net.org

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News from Drynet

A global initiative giving future to drylands

Drynet is a project of 14 organizations from all over the world. They work together to combat land degradation

GLOBAL NEWS

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Drynet Update

Welcome to the sixth issue of "News from Drynet", a newsletter from the Drynet network on global concerns for drylands from local perspectives. This issue highlights the topic of agriculture in the drylands of the world.

One of the areas in which people find themselves most affected by changing climate patterns is agriculture. Farmers all over the world are confronted with unstable rainfall, increasing drought or flash floods, new pests, temperature fluctuations and thus increased instability for their crops and income. While bigger industrialised agriculturalists can generally fend off some of the effects, small scale subsistence farmers can be completely ruined by one or two years of bad yields. In the volatile regions of the world, such as drylands, this can have far reaching consequences for the entire area, such as mounting poverty which can lead to humanitarian crisis, a mass exodus to cities, and the further degradation and decertification of lands. However, increasingly people have begun to find ways of adapting to harsh circumstances and changing weather patterns. Through stronger cooperation within communities, by using innovative

irrigation methods or by experimenting with variations in seeds and plant breeding, many people in drylands have begun to create new spaces of adaptations and survival. In this issue we would like to discuss the situation of agriculture in drylands and present some initiatives and alternatives which have sprung up.

The Drynet group is at the moment activity drafting proposals for the follow-up for the current project which will terminate in December 2009. Furthermore, some Drynet partners are presently working on bringing attention to the participative processes during the COP 9 in Buenos Aires in September this year.

By Drynet partner: Both ENDS, the Netherlands - drynet@bothends.org



Alternative agricultural Production in Drylands: Quinoa Plantation in Bolivia

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Evolutionary-participatory plant breeding:

A HOLISTIC APPROACH TO ADAPT CROPS TO AGRONOMY, CLIMATE AND PEOPLE

The massive and rapid decline in agricultural biodiversity is caused in part by the success of modern plant breeding especially in wheat, rice and maize which make up 60% of the calories in human diets. As a result the most widely grown varieties of these three crops are closely related and genetically uniform. The major consequence is that our main sources of food are more vulnerable than ever before, and that, as the well known cases of the potato famine in Ireland in the mid 1800, the reduction of corn production in 1970 in USA due to the southern corn leaf blight, and more recently the rapid spreading of UG99 from Uganda, to Kenya, Ethiopia, Yemen and Iran, by favouring the spreading of new virulence type of pathogens, genetic uniformity puts food security in danger. Genetic uniformity has very much the same effects on reaction to abiotic stresses such as temperature extremes and drought.

It is widely recognized that traditional varieties (landraces) have much greater resilience to drought and other stresses. Some of the landraces that have been lost due to the introduction of Green Revolution technologies are available in national and international gene banks. These gene bank collections serve a



Women planting seedlings in Iran. Picture by Mohsen Yosefi

very important purpose - avoiding the loss of individuals and species, and of the genes, which may be unique, they carry. On the other hand by "freezing" seeds they also "freeze" evolution at the time of the collection. Therefore, many scientists and policy makers advocate that together with conservation in gene banks - ex situ - the diversity should also be conserved in its original locations - in situ - where the plant populations can continue to evolve. In addition, the high-yielding varieties introduced through the Green Revolution require optimal growing conditions which are created through heavy use of chemical pesticides, fertilizers and water. Creating such an optimal environment has caused on the one hand farmers in favourable environments to go into debt to purchase these expensive inputs and to pollute the land and water and overuse scarce water sources, and on the other, farmers in marginal environments have been by passed by a research philosophy that do not take their special needs into account.

It is now unequivocal that the climate is warming, as it is evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level. It is also very likely that in several areas the frequency and the intensity of drought as well as the variability of the climate are increasing.

To cope with the challenges posed by genetic uniformity, climate changes and dependence on chemical inputs, it is urgent to deploy on the ground a dynamic and inexpensive strategy which will quickly enhance the adaptation of crops to climate change and hence mitigate the impact of climate change. Such a strategy is based on four components: locally adapted genetic resources (landraces), farmer's knowledge and participation, integration of plant breeding and crop management (agronomy, soil management, disease and pests management), and respect of farmer's rights. These four components are used in a multi country program of

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evolutionary plant breeding consisting in deploying populations with large genetic variability in the hands of the farmers and letting them gradually evolve and adapt to both climate and management changes including organic conditions.

At the moment one population made up by maxing an equal number of seed of nearly 1600 barley F2 is grown in 5 locations in Iran, 4 in Jordan, 4 in Syria and 3 in Algeria and will soon be grown in 3 locations in Algeria. The locations were chosen together with farmers for being affected by one or more of the abiotic and biotic stresses affecting crop yield and quality. In each location the populations will be left to evolve under the joint forces of natural and artificial selection operated by the farmers (with the skills developed through their participation in the breeding programs), and eventually by breeders (evolutionary - participatory plant breeding). These populations can be used for a short term objective to develop specifically adapted varieties to the different areas and to the current levels of abiotic and biotic stresses. At the same time, as recombination and natural selection will continue to occur, new gene and gene combination not even present in gene banks may appear. Therefore, these populations will slowly become better and better adapted and will also be used for the long term objective to develop varieties resistant to the future levels of climate and agronomic changes. As the populations evolve farmers will use a small part of the seed produced every year to

plant and harvest the evolving population to allow a progressive adaptation to the prevailing stresses. After the first years and with the availability of an increased amount of seed the population can be shared with other farmers and evolve under a number of combinations of agronomic management and climatic conditions. The remnant seed can be shared with other farmers who can start their own evolutionary populations adjusting its size to the land and resources available, or to plant their crop.

In some selected locations we will start experimenting on combining conservation tillage, improved rotations and varieties. The integration of rotation, tillage and breeding requires that at each selected location in farmer's field a given piece of land will be allocated to these experiments for the duration of the projects. The experimental approach will be to initiate with the agronomic treatment in either a 2 factor or a 3 factor experiment. In the 2 factor experiment we will have in the first year alternate strips of either the two types of tillage or two types of rotations. In the second year the participatory trials, but also the evolutionary populations, will be planted orthogonally to the direction of the agronomic treatment in a way that half of each plot (=1 variety) will be on one treatment and the other half on the second treatment. These types of trials, if repeated in at least three locations will give information on genotype x agronomic treatment x years x locations interactions. A similar approach can easily be used to adapt crops to organic agriculture.

**By Salvatore Caccarelli, ICARDA,
Presented by Drynet partner CENESTA,
Iran**

International Agenda 2009

25 - 28 August 2009 - 1st International IFOAM Conference on Organic Animal and Plant Breeding: *Breeding Diversity in Santa Fe, New Mexico, USA*. The conference aims to encourage the dialogue between commercial and subsistence farmers, scientists and practitioners, professional farmers and hobby gardeners/animal keepers to promote the lively exchange of experiences and perspectives on organic breeding.

More information: www.ifoam.org

31 August 2009 - 04 September 2009

The World Climate Conference - 3 in Geneva, Switzerland Conference organized by World Meteorological Organization. WCC-3 will build on the achievements of the First and Second World Climate Conferences and focus on how humankind can benefit from the huge advances in climate prediction and knowledge. WCC-3 will contribute to the outcomes of the 15th session of the Conference of the Parties to the United Nations Framework Convention on Climate Change, to be held in Copenhagen, Denmark, in December 2009.

More information: www.wmo.int/wcc3

07 - 11 September 2009 - SADC

Sustainable Land Management Drylands Conference in Windhoek, Namibia. The MET in collaboration with the UNDP and other partners are organizing a conference that will serve as a platform for practitioners to demonstrate best practices as well as to share lessons learned in pursuit of integrated sustainable land management (ISLM). More information: www.sadc.int

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Except from Inspiring Initiative: Partnerships for Sustainable Agriculture

AN INTEGRATED MULTI-INSTITUTIONAL APPROACH TO IMPROVED WATER MANAGEMENT IN COMMUNAL LANDS: A CASE OF POTSHINI IN KWAZULU-NATAL, SOUTH AFRICA.

A densely populated rural community in the foothills of South Africa's Drakensberg is refusing to give in to land degradation and poverty. Most people practice subsistence agriculture, growing mainly maize and beans for home consumption. Cattle are grazed in communal lands in summer when the crops are in the fields. In winter, after harvesting, cattle are allowed to graze on crop residues in the crops fields. However, decades of overcrowding - an artefact of discriminatory Apartheid land policies - and the resultant poor land-use practices are largely to blame for excessive soil erosion and the nutrient degradation of the farmers' fields.

With the help of the Farmer Support Group (FSG), farmers, especially women have been developing more sustainable and productive systems of natural resource management. Using participatory action research, cross visits and participatory monitoring and evaluation by the farmers themselves, FSG and

approximately 60 farmers shared and experimented with new technologies in farming, including water conservation measures such as trench beds, cover crops and tower gardens.

In Farmer Life Schools, farmers and facilitators interacted as co-learners in sessions held regularly to deal with specific issues. People considered to be knowledgeable on various topics were invited to address specialized topics as and when necessary. Farmers were encouraged to take up some of the ideas from cross visits and to implement them on their farmers, even on an experimental basis. In addition, field days were held periodically to share information on the innovations that were being experimented with in the project.

The successes of this joint initiative include reduced soil erosion, recharged water tables, increased access to water for agriculture, enhanced food security, increased food nutrition and health, increased crop yields and increased ability to finance household expenses. For example, the project demonstrated that the minimum tillage technique, which the project assessed against conventional tillage, resulted in maize yield increases of 168% above those of the conventional treatments.

One of the major reasons for the success of this project was the participatory, collaborative manner in which this initiative was managed. Engagement with the project deepened the understanding of the various stakeholders of multi-stakeholder partnerships and what is necessary for them to be fruitful. The project also facilitated their mutual support for one another in promoting longer term



*Dryland farmers learning new technologies and methods as part of the 'partnership for Sustainable Agriculture'.
Picture by Michael Malinga*

sustainability of development in the area. The project allowed and understanding of the breadth of issues that have to be dealt with when supporting the efforts of farmers to improve their situation. Stakeholders thus realized the need to work together and acted upon this.

As Potshini is typical of rain-fed communal farming areas in South Africa, the approaches and technologies used in this project can be applied in many areas in South Africa and elsewhere in sub-Saharan Africa.

By Drynet partner: EMG, South Africa.
For more information about this initiative please check www.dry-net.org

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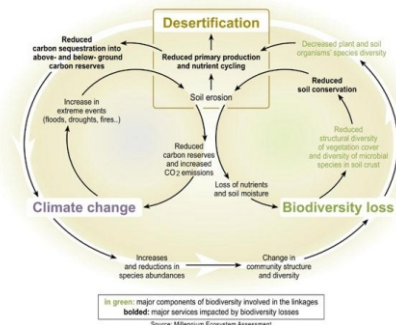
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Is there a link between desertification, global climate change, and biodiversity loss?

Desertification is associated with biodiversity loss and contributes to global climate change through loss of carbon sequestration capacity and an increase in land-surface albedo.

Biological diversity is involved in most services provided by dryland ecosystems and is adversely affected by desertification. Most important, vegetation and its diversity of physical structure are instrumental in soil conservation and in the regulation of rainfall infiltration, surface runoff, and local climate. Different plant species produce physically and chemically different litter components and, together with a diverse community of micro and macrodecomposers, contribute to soil formation and nutrient cycling. The species diversity of vegetation supports both livestock and wildlife. All plants support primary production that ultimately provides food, fiber, and fuelwood and that sequesters carbon, thus regulating global climate. Excessive exploitation of vegetation leads to losses in primary production and hence also to reduced carbon sequestration. It is the disruption of the interlinked services jointly provided by dryland plant biodiversity that is a key trigger for desertification

and its various manifestations, including the loss of habitats for biodiversity (See Figure 6.1).



The major components of biodiversity loss (in green) directly affect major dryland services (in bold). The inner loops connect desertification to biodiversity loss and climate change through soil erosion. The outer loop interrelates biodiversity loss and climate change. On the top section of the outer loop, reduced primary production and microbial activity reduce carbon sequestration and contribute to global warming. On the bottom section of the outer loop, global warming increases evapotranspiration, thus adversely affecting biodiversity; changes in community structure and diversity are also expected because different species will react differently to the elevated CO₂ concentrations. Desertification affects global climate change through soil and vegetation losses. Dryland soils contain over a quarter of all of the organic carbon stores in the world as well as nearly all the inorganic carbon. Unimpeded desertification may release a major fraction of this carbon to the global atmosphere, with significant feedback consequences to the global climate system. It is estimated that 300 million tons of carbon are lost to the atmosphere from drylands as a result of desertification each year (about 4% of

the total global emissions from all sources combined) (medium certainty).

The effect of global climate change on desertification is complex and not sufficiently understood. Climate change may adversely affect biodiversity and exacerbate desertification due to increase in evapotranspiration and a likely decrease in rainfall in drylands (although it may increase globally). However, since carbon dioxide is also a major resource for plant productivity, water use inefficiency will significantly improve for some dryland species that can favorably respond to its increase. These contrasting responses of different dryland plants to the increasing carbon dioxide and temperatures may lead to changes in species composition and abundances. Therefore, although climate change may increase aridity and desertification risk in many areas (medium certainty), the consequent effects on services driven by biodiversity loss and, hence, on desertification are difficult to predict.

Due to strongly interlinked issues and policies between desertification, biodiversity loss, and climate change, joint implementation of the UNCCD, the Convention on Biological Diversity, and the Framework Convention on Climate Change can yield multiple benefits. Environmental management approaches for combating desertification, conserving biodiversity, and mitigating climate change are linked in numerous ways. Typically, these issues were dealt with separately by different conventions and policy fora, which were negotiated and implemented independently of one another, often by different departments or agencies within national governments. Thus, joint implementation and further

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strengthening of ongoing collaborations can increase synergies and effectiveness.

Link: <http://www.greenfacts.org/en/desertification/index.htm>

MOU Signed for cultivation of Jatropha seeds

A Canadian Company, Kijani Energy will invest US\$ 150 million for the cultivation of Jatropha on large scale to produce bio-fuel in the country in next five years.

A Memorandum of Understanding (MoU) to this effect was signed between Kijani Energy Company and Pakistan Agricultural Research Council (PARC) on April 24. The MoU was inked by Chairman PARC, Dr. Zafar Altaf on behalf of the Council while Senior Vice President of the Company Junaid Mirza signed the agreement on behalf of his Company. The objective of the agreement was to promote Jatropha cultivation and development of bio-fuel culture in the country besides growing of plants on large scale.

Kijani Energy is a sustainable Energy Company which believes in the potential of green energy to solve the twin challenges of climate change and economic development. In Pakistan, Kijani is focusing on building an integrated bio-diesel company to enhance security and promote local economic development.

The Company will cultivate Jatropha over

200,000 acres of land during the current year and also intends to build an oil extraction facility in 2011-12.

Link: <http://www.parc.gov.pk/enews.html>

New possibilities in agriculture research

Agriculture scientists should explore new possibilities in agricultural research and should learn problem handling in different ways.

Dr. Zafar Altaf, Chairman Pakistan Agricultural Research Council, expressed these views while addressing agriculture scientists at Ayub Agricultural Research Institute (AARI) Faisalabad on April 13.

He said that Research Institute fully deserves better and incentive oriented pay structure to improve quality of agricultural research.

Dr. Zafar said that at PARC experiments are being conducted to grow rice without standing water and use of bio herbicides is being promoted to control weeds. He stressed the need for replacing chemical farming with organic farming to curb soil degradation and to bring sustainability in agricultural production. He also visited the farm area of AARI and appreciated the efforts of scientists in evolving high yielding hybrid varieties of vegetables and other crops.

Earlier Dr. Muhammad Rashid, Director General Agriculture (Research) briefed the Chairman about functions and organizational set up of AARI Faisalabad.

Link: <http://www.parc.gov.pk/enews.html>

Satrameel Rehabilitation

The Satrameel Watershed area is being rehabilitated on the directives of Chairman PARC with the overall objective of improving the behavior of Satrameel Watershed as well as its productivity through integrated and economically feasible interventions.



The vision of Dr. Zafar Altaf, Chairman PARC has been attempted to be translated into tangible field activities and specific objectives have been established to contribute towards the achievement of overall benchmarks of improved watershed behavior and profitability of Satrameel station. These include effective demonstration of already existing but non-functional soil, water and plantation based conservation interventions to present Satrameel as a model watershed site, introducing soil and water conservation measures, developing a long term database of key meteorological and hydrological parameters, exploring the potential of using renewable energy resources, developing a better understanding of the role of the watershed on a scientific basis, creating additional income resources by introducing market demanded products, improving general amenity of the site area, analyzing changes in catchment yields and establishing methodologies for its estimation, exploring

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opportunities of using RS and GIS tools for improving watershed management, exploring possibilities of cooperation with other lined agencies and motivation of progressive community members of Satrameel for contribution in implementation of Satrameel Rehabilitation Plan. To achieve these objectives, a comprehensive Satrameel Rehabilitation Plan has been prepared and its implementation is underway.

Drought Causes Massive Animal Migration from Thar

Friday, April 17, 2009
by SHAHID HUSAIN

MITHI: At least 60 per cent large animals (cows, camels and horses) and 50 per cent small animals (sheep and goats) have migrated from Tharparkar to greener pastures due to severe drought, according to Dr Lachman, a veterinary doctor associated with the Thardeep Rural Development Programme (TRDP), a non-governmental organisation.

"Drought will be declared in Thar if there is no rainfall by August 15," he said. "There was scant rainfall in June and July last year and crops were destroyed," he told The News.

"By November, pastures had dried up and today you will find animals eating a toxic plant called 'san' which locks their jaws," he said.

Animal population in Tharparkar is 4.5 million as compared to 1.2 million humans, a ratio of 4:1. The economy of the great desert bordering Rajasthan in

India is largely dependent on livestock.

In 2009, Dr Lachman said, livestock in Tharparkar was infected with 'pest des petites', a deadly disease in which mortality rate is 100 per cent, but the TRDP was able to identify it around Eid and undertook a vaccination campaign.

"But despite that around 1,200 small animals died. Had there been no vaccination campaign, the mortality would have been in the range of 30,000 to 40,000 animals," he said.

A sheep/goat fetches Rs4,500-5,000 in Tharparkar but its price has dropped to Rs2,500-3,000 due to weight loss. "But it is heartening that the deadly disease has been brought under control," he said.

Dr Mohan Lal, a veterinary doctor in Islamkot, said the major disease in sheep and goats was enterotoxaemia, diarrhea and bloody diarrhea, which struck in June and July at the time of rainfall. "Thari cattle yields 400 kg of meat on an average and 60,000 animals go to the Karachi market every month from Tharparkar," he said.

Livestock population in Tharparkar, he said, comprised 2.5 million sheep and goats, 500,000-600,000 cattle, 400,000 camels and about 400,000 donkeys and horses. "But at least 30 per cent of these animals had migrated to barrage areas by March from Islamkot alone as a result of the drought," he said.

With a desert area of 22,000 square kilometers, agriculture in Tharparkar is entirely dependent on rains, which come between July and September and are in the range of 200 to 300 millimeters in normal years. Sowing is done immediately after first rains. The main crop is Bajra, which matures in 70-75 days. However, more than one shower, preferably three,

is required to produce a good crop.

Consequently, light rains spread over two months produce better results than heavy showers. In addition to Bajra, which formed until recently the staple diet of the people there, Til, Gobar and cluster beans are grown. Stalks of the crops are used as supplementary feed for animals, according to noted architect and town planner Arif Hasan who has written extensively on Tharparkar.

However, most of the wells have dried up because there have been thin rains. "In union councils Pithapur and Nagarparkar, wells are the major source of water and there is no sweet water below 60 feet because these wells are charged by rainfall," said Dr Lachman.

"The scarcity of water can be gauged from the fact that women have to travel six to seven km to fetch water," he said. "In village Dedrai in Nagarparkar, both humans and animals are dependent on contaminated water of a pond," he added.

http://www.thenews.com.pk/daily_detail.asp?id=172825

Diemer Bhasha Dam Project: Finally Gets A Green Signal

The 4,500-megawatt Diemer-Bhasha dam project was approved on Thursday. The Rs. 894.25 billion dam project in the Northern Areas, approved by the Executive Committee of the National Economic Council (Ecne), will have a foreign funding component of Rs. 312.94 billion. The Dam will be located on the River Indus in Northern Pakistan, about 315 km upstream of Tarbela Dam, 165 km downstream of the Northern Areas

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capital of Gilgit and 40 km downstream of Chilas.

The 272-metre high concrete dam would have a storage capacity of 6.4 million acre-feet and it would irrigate more than 33 million acres. It would also help reduce sedimentation in Tarbela Dam

PROJECT BENEFITS:

Availability of about 6,400,000 acre feet (7.89×10⁹ m³) annual surface water storage for supplementing irrigation supplies during low flow periods
 Harnessing of renewable source of clean and cheap energy through installed capacity of 4500 MW
 Reduction of dependence on thermal power, thus saving foreign exchange
 Employment opportunity, particularly to the locals, during the construction and operation
 Creation of massive infrastructure leading to overall socio-economic uplift of the area and standard of living of people.



Land use affect on desertification

Land use changes are responses to changes in the provision of ecosystem services, and they also cause changes in



Water erosion and reduced soil conservation in semi-arid negatively affects ecosystem services

this provision. Historically, dryland livelihoods have been based on a mixture of hunting, gathering, cropping, and animal husbandry. This mixture varied in composition with time, place, and culture. The harsh and unpredictable climate combined with changing socioeconomic and political factors has forced dryland inhabitants to be flexible in land use. Population pressure, however, has led to a growing tension between two main land uses: pastoral rangeland and cultivated land use. In some areas, this led to intercultural conflicts and desertification as herders and farmers claim access to and use of the same land. In other cases, it led to synergistic interaction and integration between the two land uses, with herders cultivating more land, farmers holding more livestock, and an increased exchange of services between the two groups. The synergistic behavior among pastoralists and farmers is driven by both governmental policies and favorable market opportunities; the two groups cooperate when it is in their own vested interests. Irrigation has led to increased cultivation and food production in drylands, but in many cases this has been unsustainable without extensive public capital investment. Large-scale irrigation has also resulted in many environmental problems such as waterlogging and salinization, water pollution,

eutrophication, and unsustainable exploitation of groundwater aquifers that degrade the drylands' service provisioning. In such irrigation approaches, rivers are often disconnected from their floodplains and other inland water habitats, and groundwater recharge has been reduced. These human-induced changes have in turn had an impact on the migratory patterns of fish species and the species composition of riparian habitat, opened up paths for exotic species, changed coastal ecosystems, and contributed to an overall loss of freshwater biodiversity and inland fishery resources. On the whole, there is a decline in biodiversity and services provided by inland water systems in drylands, which further exacerbates desertification. Frequent and intensive fires can be an important contributor to desertification, whereas controlled fires play an important role in the management of dryland pastoral and cropping systems. In both cases, the use of fire promotes the service of nutrient cycling and makes nutrients stored in the vegetation available for forage and crop production. For example, dryland pastoralists use controlled fire to improve forage quality, and dryland farmers use fire to clear new land for cultivation. Conversely, fires can be an important cause of desertification in some regions when they affect natural vegetation. Excessive intensity and frequency can lead to irreversible changes in ecological processes and ultimately, to desertification the consequences of such changes include the loss of soil organic matter, erosion, loss of biodiversity, and habitat changes for many plant and animal species.

<http://www.greenfacts.org/en/desertification/1-3/4-causes-desertification.htm#3p0>