PARTICIPATION OF TC-DIALOGUE FOUNDATION (BELGIUM) IN A TPN3 PILOT PROJECT IN IRAN ON “Combination of Traditional Methods and Modern Technologies for Fixation of Shifting Sand Dunes”.

By Prof. Dr. Willem VAN Cotthem
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2002-05

As the then Chairman of the Belgian TC-Dialogue Foundation I am extremely honoured by the fact that our NGO has been chosen in 2002 as an associated partner of TPN3 of UNCCD (United Nations Convention to Combat Desertification) for a pilot project on sand dune fixation in the member countries of the Asian Thematic Programme Network (TPN3). I have very good memories about my participation in the visit of the test site in the vicinity of Tehran and the cooperation with all the partners at the installation of the demonstration field. I am copying here with pleasure the excellent proposal of this pilot project and I am adding a small series of pictures taken during our visit in 2002, with sincere thanks to our Iranian hosts.

PROPOSAL PILOT PROJECT

SAND DUNE FIXATION IN TPN 3 MEMBER COUNTRIES

A. BACKGROUND

Rangelands occupy a considerable part of the total land area in Asian countries. Many of these, especially in the arid and semi-arid zones of the continent, are vulnerable biomes and non-equilibrium ecosystems, whose sustainability has been exploited in ingenious ways, elaborated by various user groups over the millennia, especially by nomadic pastoralists ranging from west and south Asia to central and east Asia.

Shifting sand dunes constitute another considerable part of the arid and semi-arid regions, hindering sustainable development of the local communities. Successful strategies to combat desertification must include a reassessment of national and biome-based strategies of conservation of rangelands and their sustainable use. Rangelands - often being the protective border of defence against desertification - have a determining role in Asia’s strategies to prevent desertification.

In 1997, the Beijing Ministerial Conference on Regional Cooperation to Implement the CCD in Asia called for the establishment of six Thematic Programme Networks, each of which deals with a critical theme of desertification. Each Network is to be coordinated from a centre in an Asian country with competence and interest in the area in question and willing and able to host
the Network. Among these, Thematic Programme Network No. 3 is on **Rangeland Management in Arid Areas including Sand Dune Fixation**, for which the Government of Iran expressed its keen interest and offered to be the host. Iran’s wish of hosting TPN3 was formally endorsed by the International Expert Group Meeting on the CCD Regional Action Programme (RAP) for Asia, held at the ESCAP headquarters in Bangkok, 10-13 November 1998. The main purposes of this network would be:

- To re-establish sustainable systems for managing rangelands and livestock production in the rangelands in an economic and socially equitable manner.
- To further entail the definition, development and application of participatory approaches to rangeland management in order to enhance recovery of the vegetative cover.
- To increase rangeland productivity and to improve options for social and economic development for those communities, using these fragile areas.
- To apply the most effective methods to stabilise shifting sand dunes and to promote this application at the global level to solve the problems of sand dune fixation.

It is recognised that the situation of most of the rangelands in Asia was once sustainable (under indigenous resource management systems) and therefore TPN 3 iterates the need for its improvement. It also emphasises the need for rural community participation and equity. Therefore, TPN3 will aim to learn from successful examples in which a new approach to rangeland management and sand dune fixation is fostering the best traditional practices with modern technologies. To optimise the development of local economy and to minimise land degradation in the major rangeland and sand dune areas in Asia, are also core objectives of TPN 3

Based on the Beijing Conference Conclusion (1997) and lessons learnt from the past, the following principles are identified as crucial for the design of TPN3:

- A network for Rangeland Management will be established through TPN 3 focal points in the appropriate institutions or agencies, doing extensive work in these areas, introduced by the national focal point of the government.
- The national institutions of participating countries would be responsible for implementing the identified priority project portfolios and they constitute the principal members of the regional network for rangeland management and sand dune fixation.
- For each country participating in the network, an institution with relevant experience will need to be identified to act as the national TPN 3 focal point.
This network does not need to involve every member (and thus every country) in all activities all the time. However, every member country will be aware of all possibilities, but it will be actively involved only with a subset of the activities in which it is interested. In other words, a wealth of intra-regional activities can be organized, rather than a rigid set of initiatives, involving all member countries of the network. However, some activities, such as information exchange, will also involve other active TPNs.

TPN 3 will take advantage of the past experience of the DESCONAP network, of strength and official status of governmental organizations in the regions, as well as of the flexibility and in-depth capabilities available in non-governmental organizations and the civil society at large. This could also foster contributions from other organizations and agencies (governmental and non-governmental), as well as from the civil society at large. For each task, each participating institution in the network should act as a focal point for its own country. As such, it should establish and provide on-going support to a National Forum, which draws a wide and diverse spectrum of national actors with relevant expertise and concerns. Such national forums will complement the work of the member institutions and assure that each country contributes to the fullest, while sharing the benefits of the network within society.

TPN 3 is a participatory and voluntary network of country members, national institutions and local community groups, including also some associated partners, like NGOs and private companies.

Up to now, ten countries have chosen to become members of TPN 3: Iran, Jordan, Kazakhstan, Kyrgyzstan, Oman, Pakistan, Qatar, Saudi Arabia, Syria and Uzbekistan. These members share a common commitment to meeting the objectives of TPN 3. Nowadays, a Belgian NGO and a private Chinese Company are already actively involved in the preparation of pilot projects as associated partners of TPN 3. Other NGOs and companies of the private sector are invited to consider their possible associate partnership.

The core objective of TPN 3 is:

- The creation, collection and circulation of information and building up of capacity to assist the country members in re-establishing sustainable systems for managing rangelands and livestock production in an economic and socially equitable manner through regional cooperation. The following core sub-programme areas have been endorsed: capacity building on new approaches to rangeland management, data collection on indigenous knowledge, participatory approaches, comparative analysis of suitable methods for sand dune fixation.

One of the key elements of the long-term programme is:
- designing, planning and carrying out pilot projects.
From 29 April until 2 May 2002 a Pilot Project design meeting of TPN 3 was held in Bonn (at UNCCD Secretariat Headquarters), to prepare draft proposals on two pilot projects:

- on rangeland management
- on sand dune fixation.

The list of participants is provided in annex.

B. PROJECT TITLE

“Combination of Traditional Methods and Modern Technologies for Fixation of Shifting Sand Dunes”

C. GENERAL DESCRIPTION OF THE PROJECT

The shifting of sand dunes is a continuous threat for rural people in the drylands. It is one of the worst phenomena in desertification, because of its impact on the environment, on rangeland and housing.

Stabilisation and fixation of sand dunes is not only a major contribution to the combat of desertification, but also to the welfare of rural people. Therefore, the inhabitants of areas threatened by shifting sand dunes should be involved in both the planning and implementation of sand dune fixation activities. Bottom-up approach will be one of the characteristics of this pilot project.

Over centuries, people have tried to stop the sand shifting in many different ways. The most successful traditional methods belong to the construction of sand barriers, windbreaks, windscreens and shelterbelts. These can consist of lower or higher natural or artificial “walls”, installed perpendicularly to the dominant winds in the shifting sands. In absence of dominant winds, the windbreak obstacles (straw, branches, grasses, shrubs, trees, curtains etc) can also be positioned in a checkerboard pattern (squares or rectangles). Sometimes, this “windscreen method” is combined with mulching. Therefore, all kinds of materials, like straw, small branches, gravel etc, are used as a protecting layer at the sand surface, in order to limit or stop sand movement by wind.

During the last decades some “modern” mulching methods have been developed, e.g the application of bitumen or oil residues to obtain control of the mobile dunes. These bituminous mixtures can be applied with hand sprays, but also with jet guns mounted on giant tanks. Because of the polluting effect of bitumen, experts were looking for safer mulching possibilities.
One of the most recent mulching methods was developed in China. It consists of spraying a sticky, biodegradable film of synthetic organic materials over the surface, aggregating the sand particles and thus forming a more stable wind resisting layer.

Wind erosion can be stopped with all kinds of mechanical means. Obviously, the core objective of sand dune fixation is to protect the surface with a living vegetative cover (grasses, weeds, shrubs, trees etc). A basic condition for any plant growth is of course the availability of water. Drought tolerant plants only need a minimal quantity of water and therefore, they are currently used while stabilising sand dunes. Other species need more water to survive on sand dunes. A supplementary volume of water can be retained in the rooting zone through well adapted soil conditioning.

Seeding the stabilising dunes or transplanting seedlings from nurseries has normally to be followed by irrigation (hand irrigation or sprinkler systems). In many cases, seeding or transplanting was not successful due to the irrigation constraints. During the last decade, a soil conditioning method has been developed with which a large quantity of water can be stored for longer periods in the rooting zone. This modern method was successfully applied in arid and semi-arid areas in many countries and also for plant growth on sandy soils, e.g. for sand dune fixation.

Therefore, this TPN 3 pilot project will be set up to carry out a comparative study of the effect of three methods:

(a) Windbreaks
(b) Mulching or spraying
(c) Soil conditioning

In order to analyse different possibilities, these methods of sand dune fixation will be applied separately on different plots, but also in all possible combinations with a view on possible synergetic effects.

Final analysis of the results may lead to recommendations for a widespread application of the most successful methods in all regions suffering from sand dune shifting.

D. PROJECT LOCATION (TRIAL SITES)

Depending upon the availability of financial resources, the pilot project on sand dune fixation can be set up in all TPN 3 member countries or only in some of them.

It is advisable to have it in at least 3 countries to enable statistical analysis of the results obtained in different environmental situations.
As for the precise location of the trial site in every country involved, it is recommended to choose a site not too far away from the capital or a big city in order to facilitate visits by all people involved and/or interested in the project.

It is up to every country involved in the project to choose its own project location. The participating countries are expected to provide a full description of the trial site, including some pictures illustrating the actual situation, such as:

- Geographical position
- Climatological data
- Vegetation
- Local population
- Socio-economic situation

E. PROJECT OBJECTIVES

1. To test different sand dune fixation methods (traditional and modern ones, separately or in combination with one another).
2. To look for the most effective methods.
3. To produce two annual progress reports and a final report in the third year.
4. To disseminate these reports on the largest scale possible (website, hardcopies etc).
5. To open discussion on the outcome through an e-conference.

F. PROJECT DURATION – DATA COLLECTION AND REPORTING

The sand dune fixation project will have a duration of 3 years in order to enable comparative studies of the stabilising effect of the methods used and to follow plant growth over subsequent seasons or periods with difficult climatological conditions. Field observations and filling out of observation forms by junior staff members will be carried out on a weekly basis. They will report back to their national TPN 3 focal point every month.

The focal points of the countries involved in the project will send a quarterly report on the progress made to the TPN 3 Task Manager, who will produce an annual report for the first two years, plus the final report.

G. STAFF REQUIREMENTS

- 3 local labourers
- 3 project staff members (technicians )
- 1 coordinator
- Terms of reference (pro memoria )
H. BENEFICIARIES

- Local level: Village
- National level: Ministries concerned + Research Institutes
- International level: UNCCD-UNCBD + Research Institutes

I. TRAINING OF LOCAL PEOPLE

- Awareness building and capacity building
- Preparatory training of:
  - National Focal Point
  - Coordinator
  - Technicians
- Training of local people:
  - Local language
  - Vulgarised descriptions
  - Practical Field Training
  - On-the-job training

J. TIMETABLE

- Inception Workshop
- Introduction of implementing side and the place for stocking materials
- Establishing stock, constructing reservoirs, installing electricity posts, camping place, purchase of cars and vans.
- To announce that the coordination between customs and transportation was realised.
- Recruiting experts and labourers for maintenance
- Collecting data on weather, soil and vegetation
- Inviting the two partners to bring their equipment
- Training local experts
- Training local labourers
- Reporting on current situation
- Implementing plantation plan with recruitment of 20 persons for 5 days
- Buying and transporting seeds and seedlings
- Fencing
- Constructing operations (windbreaks, furrows, ....)
- Hoeing (dig small ditches for transplantation)
- Plantation of seedlings
- Initial irrigation
- Preparing the first report on the current situation.
K. BUDGET

• Pro memoria

L. PROJECT FINANCING (RESOURCE MOBILISATION)

UNCCD and the National Focal Point of TPN 3 have to contact:

- Bonn Fund for organization of event (inception workshop)
- GM
- National Governments (involved stakeholders)
- OPEC
- EU
- Asian Development Bank
- Islamic Development Bank
- Development Partners
- FAO
- World Bank

See also “Resource Mobilisation” on page 110 of TPN 3 Report of May 2001 meeting in Yazd (Iran).

M. FOLLOW-UP AFTER THE PROJECT

- 3 consecutive years after final evaluation
- set of indicators
- Influence on environment
- Two inspections per year (6 in total)
- Inspection team to be formed (TPN 3 + UNCCD)
- Extra budget needed

N. AN EXAMPLE: DESIGN OF A TRIAL PLOT FOR THE FIXATION OF SAND DUNES IN IRAN

The following description is specifically valid for setting up the part of the TPN 3 pilot project in Iran.

Other TPN 3 member countries may use this design as a sort of matrix, still being in a position to adapt it to local situations, necessities and/or preferences.
However, the TPN 3 Task Manager expresses the wish that the general concept will be respected in each participating country, in order to enable and facilitate the comparative analysis of the data collected in the different countries.

DRAFT DESIGN

1. Test Site: in the vicinity of Tehran
2. Size of Trial Plot: 12 ha in total for 8 variants of sand dune treatment with 3 repetitions (24 plots of 1/2 ha).
3. Duration of Pilot Project: 3 years.
4. Partners:
   (a) The Islamic Republic of Iran as a TPN 3 member.
   (b) THE NGO TC Dialogue Foundation (Zaffelare, Belgium), as a first associated partner of TPN 3.
   (c) The private company HE YUAN EP (Beijing, China), as a second associated partner of TPN 3.
5. Plot Preparation:
   - 3 x 1/2 ha: untreated sand dune (control)
   - 3 x 1/2 ha: windbreaks
   - 3 x 1/2 ha: mulching (spraying)
   - 3 x 1/2 ha: mulching and windbreaks
   - 3 x 1/2 ha: soil conditioning
   - 3 x 1/2 ha: soil conditioning and windbreaks
   - 3 x 1/2 ha: soil conditioning and mulching
   - 3 x 1/2 ha: soil conditioning, windbreaks and mulching

The position of the 24 blocks will be randomised.
6. Windbreaks:

This general term is used to indicate all kinds of barriers against wind erosion (transport of sand grains).

The materials used for constructing these windbreaks can be very diverse (cereal straw, root or other strong grasses, branches, even palisades, perforated plastic or rubber curtains, but also living plants, like grasses, shrubs and trees.

Depending upon the dominance of the winds, the windbreaks will be positioned in parallel lines (distance between lines to be determined for each trial site) or in a checkerboard pattern.

To stabilise the sand dunes, the windbreak-method will be applied separately, but also in combination with the mulching-method and with the soil-conditioning method.

7. Mulching or Spraying

In a number of countries, sand dune fixation is carried out with the mulching- method.

Thereby, different materials are simply distributed over the surface of the sand dunes, such as:

- Small branches
- Straw
- Organic waste
- gravel

The effect of this protective cover is, of course, the limiting of wind speed at the dune surface and the erosive forces of the wind.

In other countries, mostly oil producing ones, mulching effects can be obtained by spraying oil or bitumen over the surface. However, this very drastic method is also polluting the ecosystem. It cannot be recommended.

Lately, the Chinese private company HYEP developed a new spray, consisting of a biodegradable macromolecular substance. Application on a sandy soil leads to aggregation of the superficial sand grains. Thereby, a coherent protective layer is formed at the dune’s surface and wind erosion or movement of loose sand is restricted, even fully stopped.

It should be noted that the plots, treated with this mulching spray, should not be disturbed by walking or animal trampling, otherwise the protective film would be broken up and strong winds can blow out the holes.
The HYEP company, acting as an associated partner of TPN 3, is generously offering free spray and the necessary machinery to the part of the TPN 3 pilot project to be set up in Iran (see below).

8. Contribution of the He Yuan Environment Protection Technology Development Corp. Ltd (HYEP) to the Trials on Sand Dune Fixation in Iran.

(a) Purposes:

- To help the TPN 3 National Focal Point to set up the pilot project on sand dune fixation.
- To help to set up demonstration plots with the mulching (spraying) method.
- To initiate a feasibility study on the support of the private sector to implement the UNCCD.

(b) Responsibilities:

(i) Of the HYEP Company

- To provide 10 tons of the mulching spray and the necessary machinery to apply it.
- To pay for the shipment of the product and the machinery from Shanghai to the port of Bandar Abbas.
- To send 3 technicians to Iran to install the trial.
- To provide roundtrip tickets for the 3 technicians to and from Iran.
- The Duolun Sand Dune Fixation Demo base in China is suggested to be an integral part of TPN 3’s pilot project on sand dune fixation. It will act as a demonstration site for all interested TPN 3 members and associated partners.

(ii) Of the host country

- To take care of customs clearance and domestic transport of HYEP materials and machinery from the port of Bandar Abbas to the trial site in Iran.
- To provide electricity, water, plots of sand dunes and local manpower for the set up of the trial.
- To provide local transport and accommodation for the 3 technicians.
- To provide follow-up maintenance, monitoring and reporting systems.
(c) Criteria for field trials and data collection

HYEP will formulate the necessary criteria for field observations.

TPN 3 will be responsible for these observations and data collection on:

- Wind regime
- Radiation (sunshine)
- Climate parameters (rainfall, temperature)
- Biomass production
- Soil moisture content

(d) Reporting Systems of the Trial

- Local staff members will monitor weekly the plot site, make observations, take records and collect data.
- They report monthly to the TPN 3 National Focal Point. (In Iran, this is also the TPN 3 Task Manager).
- The National Focal Point (of countries other than Iran) reports quarterly to the TPN 3 Task Manager on the progress made.
- The TPN 3 Task Manager will be responsible for the linkage of the TPN 3 website with the one of UNCCD.
- The final report on the pilot project will be presented at regional meetings and COPs of the UNCCD.
9. Soil Conditioning

Besides the windbreak method and the mulching (or spraying) method, also the soil conditioning method can be used for sand dune fixation.

All kinds of soil conditioning substances have been used in the past, such as:

- Loam or clay amendment to sand.
- Organic matter amendment.
- Amendment of perlite, vermiculite etc.
- Amendment of volcanic rock (lava).
- Amendment of water absorbing polymers.

At the University of Ghent (Belgium), the TerraCottem (TC) soil conditioner has been developed. It consists of a mixture of different groups of substances, each of them playing a different soil improving role:

(a) Water absorbing polymers to enhance the water retention capacity and the cation exchange capacity in the rooting zone (upper 20 – 30 cm).

(b) Mineral fertilisers to enhance the nutrient concentration and to provide all nutritive elements for the plants.

(c) Organic matter to gradually enhance the microbiological activities in the rooting zone.

(d) Basic substances to trigger better growth of roots.

(e) Lava as carrier material for powders.

All these substances of the TC compound act in a synergetic way on biomass production, thus improving general plant growth with a minimum of water. TC-Dialogue Foundation, also acting as an associated partner of TPN 3, is offering a large quantity of the TC soil conditioner to all countries participating in the TPN 3 pilot project. Thereby, TC can be used as a soil conditioner for sand dune fixation with living plants, through seeding or planting of selected species.
O. AGREEMENTS OF TPN 3 MEMBER COUNTRIES TO PARTICIPATE IN THE PROJECT

- Formal request to TPN 3 Task Manager and UNCCD Secretariat
- To be included in request: description of trial site (plus pictures)
- Decision to be taken by TPN 3.

LIST OF PARTICIPANTS

Experimental Plot Design Meeting for TPN 3 29 April – 2 May 2002

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On our way to the demonstration field (Photo WVC 2002 TPN3-01-Iran.jpg)

The landscape (Photo WVC 2002 TPN3-02-Iran.jpg)
Oli mulching for sand dune stabilisation (Photo WVC 2002 TPN3-08-Oil mulching-Iran.jpg)

A thick layer of oil residues (Photo WVC 2002 TPN3-07-Oil mulching-Iran.jpg)
Breakdown at the edge of the oil mulch layer
(Photo WVC 2002 TPN3-06-Oil mulching-Iran.jpg)
The machinery of the Chinese He Yuan Company

(Photo WVC 2002-12-20 Iran TPN3-10--He Yuan Comp.-Iran.jpg)
The tank with the liquid He Yuan mulching spray
(Photo WVC 2002 TPN3-09--He Yuan Comp.-Iran.jpg)

Start of the application of the Chinese mulching spray
(Photo WVC 2002-12-20 Iran TPN3-13--He Yuan mulching-Iran.jpg)
Mist of the mulching spray solidifies on top of the sand
(Photo WVC 2002-12-20 Iran TPN3-12--He Yuan mulching-Iran.jpg)

TerraCottem soil conditioner has been mixed a hand deep with the top layer of sand
(Photo WVC 2002 TPN3-11--Inspecting TC app-Iran.jpg)
Rui ZHENG, participant of the UNCCD secretariat, at the official banner on the demonstration field (Photo WVC 2002 TPN3-05- Rui ZHENG UNCCD.jpg).