DESIRE REPORT series

DESIRE WB-3 Stakeholder Workshop 2 report

WP3.3 Stakeholder Workshop 2 report

Held in Greece, East Nestos Delta Basin, October 15th, 2008.

Authors: V. Diamantis, I. Gkiougkis, A. Pechtelidis

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Democritus University of Thrace, Department of Civil Engineering, Xanthi, Greece.

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DEMOCRITUS UNIVERSITY OF THRACE

Workshop Report - English summary

Stakeholder workshop 2

Selection and decision on technologies/ approaches to be implemented

Results and conclusions from the second stakeholder workshop

Name of the study site: **East Nestos Delta Basin, Greece**

Date of workshop: **15 October 2008**

Author(s): **V. Diamantis, I. Gkiougkis, A. Pechtelidis**

I General Information

A) Workshop

Workshop venue:
The workshop was held in a local café at the Erasmio village (Municipality of Topeiros, Greece)

Workshop moderators:
Prof. F. Pliakas, Prof. I. Diamantis

List of workshop participants:
The participation to the workshop was limited to 8 participants. Although farmers (that were previously trained in the field) were informed by personal invitations and telephone calls one week and one day before the event, only one of them participated. The rest of the farmers were just visitors who attended the workshop. It was thus concluded that the best option for training is to directly be involved with each farmer separately and of course on his field.

The participants list is limited due to the reasons stated above.
1) Pirostianis Vasileios, vice mayor
2) Efi Salteri, Civil Engineering Student
3) Ilias Fousekis, Environmental Engineering Student
4) Five (5) Local farmers

B) Background information

During the first stakeholder workshop training was provided to a large number of participants regarding traditional soil reclamation strategies (Figure 1). Existing soil reclamation strategies have been documented in the first workshop report. Most of them were applied once or scarcely by one or more farmers, thus data concerning the efficiency of each method were not available. Consequently, these technologies were not reported in the WOCAT questionnaire.

Figure 1. Photographs from the first stakeholder workshop (19 December 2007)
However, it was identified that the local-traditional technology applied by a broad number of farmers, for land reclamation and productivity increase, was the **transportation of freshwater from local streams and canals** and its application on the field for irrigation purposes (Figure 2). The technology enables the use of freshwater in fields traditionally irrigated with saline groundwater. As a consequence several hectares of land, adjacent to streams, were improved while others were seriously damaged (mainly sodic soils).

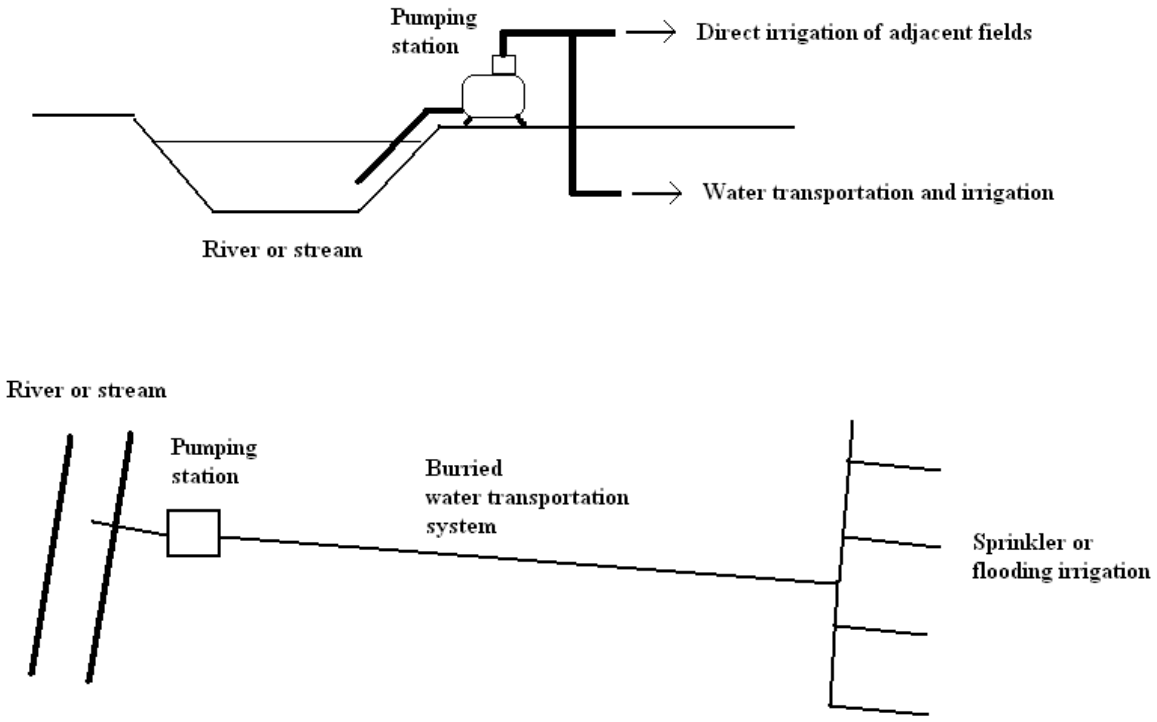

Figure 2. Schematic representation of the soil water conservation technology (GRE1).

This technology requires the purchase by the farmer of an oil (or electrical) pumping station and appropriate tubing to transport the water to the field. The capital expenses are approximately 1000 Euro for the oil pump (10 hp) and 5 Euro/m for the transportation network. The major costs involved, however, are related to oil consumption during continuous operation of the pumping stations. The technology has been described in detail in the WOCAT GRE1 questionnaire.

One barrier towards broader application of this technology in the hotspot area is the **local water policy**. The later permits water transportation in a distance not higher than 500 m from the water source. Consequently, the permission for water usage and accordingly the permission to install of an electrical supply for pumping station operation can take place only within those distance limits (500 m). The rest of the farmers, transport water illegally, by using diesel/oil pumps, thus the operational costs involved are significant rendering the method as not feasible (especially during periods of high oil prices).

One important issue that must be taken into consideration is the completion and operation (since 1997) of two major hydroelectric dams (Thesauros, Platanovrisi) in the Nestos River basin. During the design phase of these dams a significant amount of irrigation was planned to be transported in the region under consideration. However, this never took place and the farmers of the region are really concerned about this progress.

II Results and conclusions

A) Workshop objectives

Since the participation in the second workshop was limited (see Figure 3) the original planning was modified. Initially, **the overall aim** of the second workshop was to select technologies/ approaches, for combating desertification and remediation of land, to be implemented in different the fields of the farmers trained during the previous project period. The selection was expected to be made in cooperation with those farmers according to a participatory approach.

Unfortunately, due to limited participation the workshop focused on:
- Presentation of the basic principles for soil degradation due to accumulation of soluble salts and exchangeable sodium
- Presentation of soil quality in the hotspot area (results obtained during previous field campaigns)
- Identification and evaluation of different reclamation strategies
- Selection of the most promising methods for field evaluation (general discussion).

Figure 3. Photographs from the second stakeholder workshop showing presentations and discussions about different amelioration strategies (15 October 2008).

B) Results

Since the updated objectives of the workshop were the discussion of different amelioration strategies, for the reclamation of saline and sodic soils, the **principles and major characteristics** of each method were initially presented. Simultaneously with the presentation, an open discussion was in progress regarding the applicability, the labour required, the efficiency, the environmental impacts and the costs involved. In Tables 1 and 2 traditional and novel soil reclamation strategies are presented. Several of these technologies were rejected by the farmers, while others were mostly

preferred. In Table 2 the overall assessment of the novel reclamation strategies is given.

Table 1. Traditional methods for saline and sodic soils reclamation

1. Groundwater table control
   - Surface drainage canals
   - Groundwater level decline by wells
2. Improvement of soil internal drainage
   - Deep ploughing
   - Buried perforated tubes
   - Hardpan perforation using soil auger equipment
3. Use of calcium to remove exchangeable sodium
   - Gypsum
   - $CaCl_2$
4. Use of crops tolerant to salts
5. Prevention of salt and sodium accumulation
   - Freshwater transport and irrigation with freshwater
   - Irrigation method
   - Collection of winter rainfall for salt leaching
6. Soil improvement using compost, organic matter addition, etc

Table 2. Evaluation of novel methods for soil reclamation

Methods	Costs	Efficiency	Impact	Interest
Irrigation with treated wastewater	+*	+++	+	+
Bio-drainage	++	+	0	+
Fungi treatment	+++	++	+	++++
Vegetative reclamation	+++	+	0	+
Irrigation timing and control	++++	++++	0	++++
Genetically modified crops	+++	++++	++++	+

* requires municipal treatment plant and water transportation network.

In general, the **most promising strategies**, for application in the field included:

- Freshwater transport in local level (this will be tested in a traditionally groundwater irrigated field)

- Gypsum application (to be tested in combination with freshwater transport)

- Deep ploughing (to be tested in combination with freshwater transport and gypsum application)

- **Irrigation timing and control** (to be preliminary tested in the field by installation of relevant soil moisture and electrical conductivity monitoring equipment).

Biological treatments using Arbuscular mycorrhizal fungi received positive acceptance by the farmers, however the applicability seem to be limited by the availability of this material in the market.

Genetically modified crops tolerant to salts, although can significantly increase production under saline conditions, were not favoured due to possible negative environmental consequences.

III Evaluation of the workshop

Within the merits of the DESIRE project, the second Workshop was organized in Erasmio, Xanthi (15 October 2008). The workshop consist an introduction to the DESIRE project by presenting the objectives and activities of the project. Additionally, recent data concerning groundwater and soil quality of the study region were presented. Finally, traditional and novel methods for soil reclamation were presented and evaluated in a discussion forum.

Difficulties encountered:
There was limited participation, especially of those farmers that were previously trained on the field, although they were informed several days in advance about the workshop. It might be possible that the farmers do not want to be trained in different villages but they prefer their own site (village, local café, etc).

Changes made concerning the procedure suggested in the workshop guidelines:
a) Since the participation of the target farmers was not as expected, the second workshop was performed as a training seminar. However, an interesting discussion forum was performed and data were gathered regarding the applicability and acceptance of traditional and novel reclamation strategies.

b) Since the participation to the second workshop was not optimum, **a third workshop** was conducted on 10/12/2008 (Figure 4). During this meeting, the participation included farmers that were previously trained in the field and the discussion focused on deciding which reclamation technologies will be applied on their fields. Consequently, the transportation of freshwater was decided to be performed during the third project year, followed by gypsum application and deep ploughing. During the second year, monitoring of three different fields, one irrigated with freshwater from local streams, and two with groundwater, was selected in order to provide data about the effect of local technology on soil quality and productivity.

Figure 4. Presentation of the results obtained during previous field campaigns and discussion about field strategies selection, during the third stakeholder workshop (10 December 2008).

How was the interest and participation of the different stakeholder groups in the workshop?
There was increasing interest by the farmers who attended both meetings, concerning novel reclamation technologies.

Recommendations:
It is advisable that the training is performed directly one-by-one with farmers and of course on their field.

Comments:

Table 2. Evaluation by farmers of **novel reclamation technologies** and approaches for saline and sodic soils.

Technology / approach	**Already applied or potential solution?**	**On land use type** (e.g. crop land / grazing land, etc.)	**Labour** required (initial and maintenance)	**Costs** (initial and maintenance)	**Impact / Effectiveness**						**Limiting factors / constraints**	**Overall assessment of the potential for the local context**
					economic		ecological		socio-cult.			
					ST	LT	ST	LT	ST	LT		
Irrigation with treated wastewater	Potential solution	Crop land	Very low	High (for the municipality)	++	++	++	++	++	++	Construction of wastewater treatment plant and distribution network	+++
Bio-drainage	Potential solution	Crop land	Medium	Medium	0	+	++	++	++	++	Pledge of irrigated land. Biodrainage requires long periods.	+
Fungi treatment	Potential solution	Crop land	Low	No data available	++	++	++	++	++	++	Biological material not currently available in the market	+++
Vegetative reclamation	Potential solution	Crop land	Low	Low	0	0	++	++	0	0	Pledge of irrigated land. Reclamation process requires long periods (~ 2 growing seasons)	0
Irrigation timing and control	Potential solution	Crop land	Low	Medium	++	++	++	++	++	++	Equipment for soil moisture content and salinity monitoring not available in local market	+++
Genetically modified crops	Potential solution	Crop land	Low	Not data available	++	++	--	--	--	--	Concern about possible environmental consequences	--

Legend: ST = short-term LT = long-term

Labour and costs: very low, low, medium, high, very high

Impact / effectiveness: **+++** (very positive), **++** (positive), **+** (slightly positive), **0** (medium),

- (slightly negative), **--** (negative), **---** (very negative)