



## **Access to Safe Drinking Water Through Nadi Water Filter in Remote Rural Jati Areas (Thatta) Sindh Pakistan**



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## Final Evaluation Report

<b>Project #</b>	<i>(Office use)</i>
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## Acronyms

<b>ADB</b>	Asian Development Bank
<b>AHD</b>	Association for Humanitarian Development
<b>APFED</b>	Asia Pacific Forum for Environment and Development
<b>BSNF</b>	Bio Sand Nadi Filter
<b>CBO</b>	Community based organization
<b>C°</b>	Degree centigrade
<b>H &amp; H</b>	Health and hygiene
<b>IO</b>	Implementing organization
<b>LoA</b>	Letter of understanding
<b>ml</b>	Milliliter
<b>NetRes</b>	Network of research institutes for sustainable development
<b>NGOs</b>	Non Governmental Organizations
<b>NWF</b>	Nadi water filter
<b>PoW</b>	Plan of work
<b>pH</b>	Hydrogen ion concentration
<b>Q&amp;A</b>	Questions and answers
<b>SDPI</b>	Sustainable Development Policy Institute
<b>TF</b>	Timeframe
<b>ToT</b>	Training of trainers
<b>UK</b>	United Kingdom
<b>UNEP</b>	United Nations Environment Program
<b>USA</b>	United States of America
<b>WHO</b>	World Health Organization



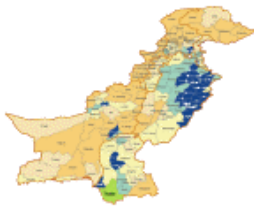
## Preface

The Asia-Pacific Forum for Environment and Development (APFED) Showcase Facility is a joint activity of the UNEP, acting as the Showcase Facility Secretariat and the Institute for Global Environment Strategies (IGES) acting as the APFED Secretariat. The Showcase facility aims to demonstrate, through the implementation of showcase projects, innovative practices for sustainable development in the Asia and Pacific region. The Showcase programme will enable stakeholders to overcome implementation barriers, to promote good practices and to explore potential for wider replication within the country and within the region {1}.

Following a call for proposals by APFED secretariat in 2007, Association for Humanitarian Development (AHD) Pakistan submitted a project proposal entitled, “Access to safe drinking water in rural areas by provision of 1000 Nadi filter water units in Jati coastal area of district Thatta, Sindh. The project was selected by the APFED Showcase Panel for implementation. The Panel also selected Sustainable Development Policy Institute (SDPI), Pakistan, one of the registered institutes of the APFED Network of Research Institutes for Sustainable Development (NetRes), as partner organization in the implementation of this showcase project in Pakistan.

The APFED NetRes is aimed at promoting collaboration among research institutes for providing strategic advice and recommendations in facilitating the development and implementation of policies, programs and activities in pursuit of environmental management and sustainable development. APFED NetRes has been established by research institutes active in promoting environmental management and sustainable development {2}

## Location Map



**Fig.1** Map of Pakistan



**Fig.2** Sindh Province/District Thatta



**Fig.3** Project site: Jati.



# **Access to Safe Drinking Water Through Nadi Water Filter in Remote Rural Jati Areas (Thatta) Sindh Pakistan**

## **Summary**

The project site is around Taluka Jati area of Thatta District about 200 km from Karachi, Sindh provincial capital.

There is shortage of water in the above area. The situation becomes worse during heavy monsoon season, floods and in the hot months of June to August. The ground water is not only accessible at higher depths but is also totally brackish and unfit for drinking purposes, resulting in the spread of waterborne diseases among the population of the area.

This showcase project of one year duration, under Asia Pacific Forum for Environment Development (APFED), was designed to raise health & hygiene awareness and provide support to the communities in the affected area towards access to safe drinking water by providing, low cost, effective, easy to assemble, maintained & operated, Nadi Water Filter (NWF) units from locally available materials.

Through formation of community based organizations (CBOs) at village level & training and awareness raising workshops, the project aimed at providing material and training to the household representatives of local communities, to assemble, install and operate NWF units at household levels for safe drinking water supply to the household families.

In a short span of 12 months, 20 village CBOs were constituted, and through self-help organized 20 health and hygiene and 4 train the trainers (ToT) workshops. Over 1000 NWF units were installed and are operating in 20 villages of Taluka Jati area.

It is estimated that 1000 families and over 15, 000 individuals have become well-informed about water borne diseases and would continue to have access to safe drinking water for their day-to-day needs. A marked decrease has been reported by Nadi water filter users, in the number of their family members, specially infants/children's visits to doctors/hospital..

There is a general interest expressed, by the local communities, NGOs and a few donors for providing further support to this project to enhance Nadi water filter use in other remote rural areas of Sindh.

In this report details are described of the project objectives, methodology employed, activities carried out, results achieved, analyzed and discussed.

## **1. Outline of the evaluation study**

### **1.1 Project background**

The project site is around Taluka Jati area of Thatta District (23°43' to 25°26' North latitudes and 67°05' to 68°45' East longitudes) about 200 km from Karachi, Sindh provincial capital and 160 km from Hyderabad city. Thatta is a remote coastal area touching Arabian sea. The total area of the district is 17,355 square kilometers. Generally the temperatures are 20 - 22 degree C in winter and 25 to 35 degree C in summer with very low annual rainfall and high humidity. According to 1998 population census data, the population of Thatta district, comprising of nine Talukas (sub-district area with specified boundary), including Jati, is recorded at 1113.19 thousands, with an average annual growth rate of 2.26%.

The targeted 22 villages, at the project site, Jati, Thatta District are vulnerable and over the years have faced natural disasters like sea intrusion, flood, fire, drought and cyclones. These frequent major disasters have caused adverse impacts on the lives of villagers and communities of the area, such as losses due to natural resource degradation, migration, lack of social infrastructure, changing livelihood patterns, shortage of drinking water, school drop outs, health., leading to enhanced poverty.

There is shortage of water in the project area. The ground water is not only accessible at higher depths but is also totally brackish and unfit for drinking purposes. The situation becomes worse during heavy monsoon season, floods and in the hot months of June to August. The very poor communities of the remote Taluka Jati area, even have to drink water standing on their agricultural crops, resulting in the spread of waterborne diseases among them, specially children and infants. During the water shortage period, water for human consumption is used from the small raining water ponds, normally the drinking place of cattle/stray animals

To meet the basic day-to-day needs in situation described above, most of the villagers are left with no choice but to leave their homes to safer areas. In such situation, the availability of some means to access safe drinking water (such as Nadi filters) may reduce seasonal migration and the villagers and they may not have to drink water of the nearby irrigation canal, causing water borne diseases.

## Nadi Drinking Water Filter:

The easy self help AHD Nadi filter is unique in its design, Cheap and easy to make at

NWF Assembly



NWF Assembly



NWF Assembly



Water purification with NWF



household level. The filter consists of backed clay Nadi & Matca, sand & gravels of different mesh sizes and a rubber or plastic tube. The design and assembly of the filter is very simple and the material required to construct, functional and maintain are easily accessible in a rural setting. (step wise details of procedure for its construction assembly are given in Annex 5).

The effectiveness of the Nadi filter unit is very evident from the colour, taste & transparency of the water filtered through it, as well as the laboratory reports of bacteriological examination of the filtered water samples Annex 2 (A).

Between January – June, 2007, with financial support of support of ADP, USA Office and Hope for the Children UK, 150 families in 10 villages were provided with safe drinking water Nadi filter units. These were well used and maintained by the village communities and created interest and demand for more by the communities of the surrounding nearby villages.

### **1.2 Project Overview**

There is shortage of water in Taluka Jati area of Thatta District, Sindh, Pakistan. The ground water is not only inaccessible at higher depth but is also unfit for drinking purposes, resulting in the spread of waterborne diseases among them. This showcase project of one year duration

(December, 2007 to November, 2008), under APFED, has been designed to raise health & hygiene awareness and provide support to the communities in the affected area towards access to safe drinking water by providing, low cost, effective, easy to assemble, maintained & operated, Bio Sand Nadi Filter (BSNF) units. Through formation of community based organizations (CBOs) at village level & training and awareness raising workshops, the project aims at providing material and training to the household representatives of local communities, to assemble, install and operate BSNF units at household levels for safe drinking water supply to the household families. At the end of the one year project period, 1000 BSNF units are planned to be operating in 20 villages (50 BSNF Units/village) of Taluka Jati area. It is expected that 1000 families and over 15, 000 individuals would become well-informed about water borne diseases and would have the benefit of having access to safe drinking water for their day-to-day needs.

### **1.3. Study Objectives**

Within one year time period, December 1, 2008 to November 2009, in Jati, Thatta district:

- a. Organization of women in 20 vulnerable villages of coastal area into 20 CBOs.
- b. 20 Capacity building trainings on health & hygiene awareness workshops conducted among 100 women leaders in 20 villages and 4 TOT training Nadi filter conducted among the women CBO members.
- c. Sustainable access to safe and clean drinking water for 1,000 families and 12,000 Individuals, by provision of 1,000 Bio-Sand Nadi filter units.

### **1.4. Scope of Work**

To facilitate awareness raising about safe drinking water use, trained the communities in the 20 villages of the project area and within study period, through formation of local CBOs, provide about 1,000 Nadi filter units, for the local communities to have sustainable access to safe drinking water for use.

### **1.5. Study Period**

Dec 1<sup>st</sup> 2007 to Nov 30<sup>th</sup> 2008 (One year)

## **2. Methodology**

### **2.1 Evaluation Questions**

Three sets of “Questionnaire” for survey/field work were developed.

One of these was used to collect baseline data of villages in the Jati area. The information looked for was the village population, number of families/houses, general health of household, specially children state of health and most importantly, the source, access, quantity and quality of drinking water in use, prior to introduction of Nadi filters in the area. The information from the respondents helped in developing a criteria based on the population size & level of access to safe drinking water, for the selection of the villages for the study (sample questionnaire is given in Annex 2 (B)).

For the end of project evaluation, one questionnaire set each was separately prepared by AHD and SDPI. The questions were set to evaluate the need of the project, quality & usefulness of the Train the Trainers (ToT) and Health & Hygiene workshops, performance of the resource persons/trainers of the workshops, acquired level of skill through training to assemble, operate and maintain Nadi filters in the households and working/sustainability of Nadi filters. (sample questionnaires are given in Annex (C & D))

### **2.2. Methodology**

22 villages were selected at the project site, Jati, district Thatta. The names of the villages, Taluks (specified sub-areas), village population and number of households are given in Annex 2 (A).

#### **2.2.1. Village CBOs**

AHD team of five persons (a coordinator, a supervisor & 3 field workers) of both males & females, with educational qualifications a Bachelor degree (and above) were sent to each selected village to motivate villagers for constituting a CBO. Field workers were trained both by AHD senior staff as well as by hired professionals, prior to their visits. It was ensured that at least one member of the team was fluent in spoken local language (Sindhi). Group meetings were held with villagers as well as one-to-one meetings with village elders, local government representatives, political and local religious leader and school headmaster/headmistress. Minimum number of persons for a village CBO was kept to 10, with no restriction to the maximum number of persons in a CBO. AHD team helped and guided CBO members to elect a CBO focal person and depending upon the population of the

village, 2 – 4 representatives for ToT workshops. Representatives of Village CBOs trained in training of trainers (ToT) workshops, further trained the members of the respective village CBOs.

## 2.2.2. Training of for assembling, installation and maintenance of Nadi Filters

### *2.2.2.1 Training of Trainers Workshops:*

Half-to-full day ToT workshops were held at four different clusters of villages in the Jati area. Open space of a central primary school was selected by the AHD team and necessary training material, including Nadis & Matkas was transported to the school prior to the workshop day. Villagers were given hand-on- practical training in smaller groups of 4 – 6 persons by AHD staff. Printed instructions to the representatives of village CBOs for further training of the members of village CBOs. The primary school was also used for distributing material of Nadi filter to CBOs in the surrounding villages through their representatives. NetRes representative from SDPI, Islamabad also participated in 3 of the four ToT workshops held in Jati area.

### *2.2.2.2. Training of members of village CBOs:*

Nadi filters were installed by male family members of each household member of the village CBOs, under the supervision of the trained CBO representatives. Members of AHD field team visited each village CBO from time to time to check the functioning and maintenance of each Nadi filter installed at households.

## 2.2.3. Health and Hygiene workshops for female villagers:

A well qualified 3-members AHD female team traveled to each selected village of Jati area and conducted one day health and hygiene workshop, in a participatory manner, with female residence of the village, in collaboration with the village CBO. Because of low female literacy in the area, the information dissemination was done through pictorial charts, pictures, small skits/plays, games and informal discussion in local language. There was no limit to the size of the female group.

## 2.2.4 Procurement of material for Nadi filters:

The material, including Nadis & Matkas, was purchased periodically at the end of workshop from local dealers in Hyderabad and Jati and transported to the selected primary school in a cluster of villages.

### **2.3. Schedule of the Study**

**Dec., 2007 – March, 2008:** Hiring of AHD project staff; field visits; identification and formation of village CBOs; ToT workshops for representatives of village CBOs; health and hygiene workshops for village female residents; procurement/ installment of Nadi filters; field visit by NetRes.

**April – July, 2008:** health and hygiene workshops for village female residents; procurement/ installment of Nadi filters; mid-project field visit by NetRes

**August – November, 2008:** procurement installment of Nadi filters; end-of-project evaluation workshops/meetings; field visit/evaluation by NetRes; final project/expenses report.

Details are given in Annex 3

## **3. Results**

### **3.1. Project Implementation**

#### **3.1.1. Planned and Actual Input**

- a. APFED: Partial financial support of US dollars = 19,670/-
- b. AHD: Core funding of in Pak. Rupees Eq. US dollars = 4,700/-; staff time, logistics support; utilities, furnished office space & support staff time.; support towards planning/execution of the project activities.
- c. SDPI: Support towards revision of project proposal, work plan, time frame; planning/execution of project activities, field visits/participation in ToT workshops; report writing and periodic supervision/monitoring/evaluation of project.

#### **3.1.2. Planned and Actual Activities**

1. Formation of 20 village level women CBOs in 20 poor villages of Jati area district Thatta, as planned. (Annex 2 A)
2. Arrange 4 TOT Nadi filter training workshops in 4 cluster areas, as planned. At each training volunteers/CBOs representatives of 5 villages to be trained (Annex 2 E&F).
3. With CBOs support, to arrange 20 health & hygiene trainings for women to promote women and child health in 20 villages (Annex 2 G)
4. Procurement, assembly, operation & maintenance of over 1,000 Nadi filter units in Jati area within a year time frame (Annex 2 H).

5. Interactions and meeting with officials of local government, people representatives and other stakeholders/donor agencies, for the sustainability and extension of the project activities in other nearby villages and surrounding areas of Jati.
6. 4 quarterly and end of project final reports submission to SDPI and APFED showcase project

### **3.2. Relevance**

There is shortage of water in many areas of district Thatta of province Sindh. The ground water is not only accessible at higher depth but is also unfit for drinking purposes, resulting in the spread of waterborne diseases among them.

Lack of awareness about health & hygiene and good practices for the same among the target groups (residents) of the targeted area (Jati)

The project activities were limited to 20 most affected villages in the area due to time constraint, inadequate funding and tiny scattered population.

Project activities were carried out by informal interactions on self-help basis through local CBOs which are expected to act as nucleus for continuity of project activities within the target area and their enhancement in the adjacent areas.

Access to safe drinking water to be provided to over one thousand families in the project area for the benefit of many people, minimizing adverse health impacts of unsafe water, earlier, used by them, specially for infants and children.

### **3.3. Effectiveness**

All project objectives were achieved as scheduled and within the pre-set time frame.

Over 20 village CBOs are very much in place and discharging their assigned responsibilities of promoting Nadi water filters, its maintenance & sustainability and awareness raising among the respective village females population, with regard to good healthy practices and use of safe drinking water. AHD office in Hyderabad has been receiving requests from villages in the surrounding of Jati areas to provide know-how and support for installation of Nadi water filters there.

The need & effectiveness of the train the trainers (ToT) workshop have been well indicated by the data obtained through the survey/questionnaire (Annex 2 C&D) carried out in the

project area. According to 92% respondents, ToT workshops were necessary and 76% told that they could not have assembled and operated Nadi water filter without having such training. 82% trainees had no difficulty in conducting and training other CBOs members in their villages.

80% respondents considered health & hygiene workshops necessary and useful. However, majority of the respondents (58%) thought the information given in the H&H workshops was not easy to understand. 50% respondents recommended holding H&H workshops in other villages and offered support in organizing the same.

98% respondents informed that one Nadi water filter was enough to meet the drinking water needs of their households. All the respondents of the survey questionnaire, confirmed effectiveness of Nadi filter units, as the filtered water was observed to have no turbidity, taste or odor, compared to the unfiltered water. (Bacteriological examination results given in Annex (2 I)). Most of the respondents informed a decrease in the number of visits of their households to doctors/hospitals over the last 6 – 9 months. 82% occasionally took their children to doctors/hospitals, whereas 8% each often or very often. 2% did not respond to this question.

Some general comments by a few participants at the end of final project meeting are given in ( Annex 2 J)

### **3.4. Self-reliance of the Project**

The project was designed to ensure project sustainability based on self-reliance in remote rural areas.

Material is simple, low cost, locally made (could also be self-made) and conveniently accessible. The tools (hammer, sieves) once purchased last long. and can be moved and used from place to place.

Nadi filter unit is very simple to assemble, operate and maintain. No special skills are required for assembling the unit or to run it for filtering water.

No energy (electricity/fuel) is required for assembling or operating Nadi water filter, making it more viable in remote rural settings like Jati.

Local villagers were trained as trainers to promote and support the use of Nadi filters in their own as well other villages in the area.

Self-help has been promoted through local CBOs, who motivated Nadi users to make some nominal contribution for having a Nadi water filter for their households/family.

Nadi water filter project was welcome by the residents of the area, as indicated by the data obtained through the survey/questionnaire ( Annex 2 D) carried out in the project area All respondents were in support of the project continuity and its further promotion on self-help basis. They were of the view that Nadi water filter would also be very welcome in the surrounding areas and 82% respondents were of the view that government should support Nadi water filter use on priority basis in its national drinking water programs.

Since launching of this project with partial financial support by APFED/UNEP and advocacy through different forums& media by SDPI, some organizations like AusAid, German Counselate General, ADP and Oxfam GB and Oxfam NOVIB have expressed interest and support towards promotion and further use of Nadi water filter use in the country.

### **3.5. Participation**

An informal participatory approach was maintained all along for project activities.

Contacts were established with the village elders, teachers, local government officials, people representatives, and religious scholars/personalities, in raising awareness about the project and in constituting CBOs.

In consultation with the members of the respective village CBOs, project activities, selection of representative trainees for ToT workshops and identification of households for installation of Nadi filter units were done. CBOs were most active and helpful in arranging/setting up of venues, disseminating information and organizing ToT and H & H workshops in over 20 villages.

Local language (Sindhi) was mostly employed (spoken/written) to enhance participation.

## **Analysis of Factors Attributable to Project Results**

Many factors could be attributed to the success of this project and results achieved.

One of the major factors was the relevance of the project to the very need of the people in the project area. There is shortage of water in Jati area of Thatta District in Sindh, Pakistan. The ground water is not only accessible at higher depth but is also unfit for drinking purposes, resulting in the spread of waterborne diseases, specially among infants and children. This was also evident from the very warm welcome the project received and the on-going requests to AHD, for support in providing Nadi water filter by the people of Jati and the surrounding areas.

The immediately observable improved quality (transparency, taste & odor) of Nadi filtered water, by the un-educated villagers, compared to unfiltered/canal water of filtered water to AHD has a most wonderful reach at grass root levels and an effective networking with community elders/local government officials in the area. AHD credibility because of their earlier successful interventions in the area was also a great help in getting people support for the project and in meeting project objectives.

There was a high level of commitment by AHD training teams as well as field workers in performing project activities which were well planned/organized by the project management.

AHD was well supported and guided by NetRes Institute in planning implementing activities, prior to undertaking an activity first time.

Other factors include simple, low cost Nadi water filter and easily comprehensible and transferable technology, taken to the doorsteps of the very needy..

### **3.6. Conclusions**

The project was well planned and well executed, meeting all objectives within the scheduled timeframe.

In a short span of 12 months, 20 village CBOs were constituted, and through self-help organized health and hygiene and train the trainers (ToT) workshops and installation of Nadi water filters in the villages of the project area, Jati..

Over 1000 Nadi water filter have been installed with the support of ToT workshops trainees, representing 20 village CBOs which are successfully functioning, providing safe drinking water to many families and people in the remote villages in Jati area.

A marked decrease has been reported by Nadi water filter users, in the number of their family members, specially infants/children's visits to doctors/hospital.

There is a general interest expressed, by the local communities, NGOs and a few donors for providing further support to enhance Nadi water filter use in other remote rural areas of Sindh.

The project and coverage of project activities in local media and over the internet, enhanced NetRes (SDPI) focus on water issues and our interactions/networking with other national and international groups, working on drinking water issues. Access to safe drinking water is a component of a SDPI 3 years proposal on water issues, which has already been submitted and is under consideration by the Government of Pakistan.

This project is a fine example of a "Success Story," of people at grass root level- and needs publicity & projection and support for replication at other places, to provide access to safe drinking water, to people who have no other means for the same.

### **Lessons learned**

- Cooperation of the local officials, people representatives, religious scholars/personalities and a command of local language or effective interpretation are keys to the success of a community based project in remote rural areas.
- Detailed discussion and support was provided by NetRes , to the implementing organization (IO) in planning of activities, detailed programs and time frame. The time spent at this phase, prior to the start of project activities, was most worthwhile, as there remains absolute clarity in the minds of the staff of the project implementing organization, with regard to the understanding, execution & completion of the project activities according to the agreed time frame, throughout the duration of the project.
- Local language as medium of instructions by the local trainers, made the learning very effective for the trainees who had little formal education.
- A thorough understanding and full cooperation between NetRes and IO and the excellent communication between APFED Secretariat and NetRes were key to the success of this project.

#### **4. Recommendations To The Implementing Organisation (By Netres)**

- AHD field team should continue to keep in touch with the village CBOs, visit and monitor the installed Nadi water filter units from time to time to offer advice, as needed.
- AHD staff may provide support towards holding ToT and H & H workshops, organized by village CBOs on self-help basis.
- Laboratory testing for quality of Nadi filtered water samples (as many as affordable) be carried out to further establish the effectiveness of Nadi water filter unit.
- AHD may explore cooperation and support of other organizations, specially NGOs/CBOs, working in Sindh for further promotion of Nadi water filter in the remote rural areas of the province.
- Efforts may be made to introduce and use Nadi water filter in other parts of Pakistan as well as other countries of the Asia Pacific region.
- Integration of business partners into the project may be looked at for the financial sustainability of the project and further work.
- AHD deserves congratulation on the successful completion of this project in a remote underdeveloped rural area, meeting all the objectives of the project within schedule time frame.