



Climate Change Adaptation: Introducing & Promoting Energy Efficient Technologies in the Flood Affected Remote Underdeveloped Rural Areas

“Energy Efficient Cooking Stoves (EECS) – A Case Study”



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Islamabad Pakistan

January 2012

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- SUSTAINABLE DEVELOPMENT POLICY INSTITUTE

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January 2012

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Acronyms

BEE	Bureau of Energy Efficiency
C ⁰	Degree Centigrade
EECS	Energy Efficient Cooking Stoves
GC	Governing Council
GCM	Global Circulation Model
GHG	Green House Gas
KPK	Khyber Pukhtunkhwa
LED	Light Emitting Diodes
NGO	Non Governmental Organization
NIC	National Identity Card
NIDA	National Integrated Development Association
NIE	National Institute of Electronic
PaRRSA	Provincial Reconstruction Rehabilitation & Settlement Authority
PCRET	Pakistan Council for Renewable Energy Technologies
PDMA	Provincial Disaster Management Authority
SDPI	Sustainable Development Policy Institute
SWF	Sahara Welfare Foundation
R & D	Research and Development
TTW	Train the Trainers Workshop
UNDP	United Nations Development Program
UNEP NATCOM ROK	United Nations Environment Program National Committee, Republic of Korea

Acknowledgement

Support of Provincial Disaster Management Authority (PDMA), Provincial Reconstruction Rehabilitation and Settlement Authority (PaRRSA) and Commissioner, Malakand Division is gratefully acknowledged.

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“ Energy Efficient Cooking stoves (EECS) – A case study ”

UNEP National Committee for the Republic of Korea (UNEP NATCOM ROK) has been set up under the Governing Council (GC) Decision 13/33 of 1985 which authorized the establishment of national environmental committees world-wide in order to support the activities of UNEP. Supported by UNEP Headquarters and Regional office for Asia and Pacific, UNEP National Committee for the Republic of Korea is a channel for communication with the public in Korea and has great variations in core activities from one country to another. UNEP NATCOM ROK is actively working for strengthening and achieving organizational missions in various ways such as facilitating public participation (NGOs, Major Groups and individuals) in UNEP activities

An envisaged core element of the UNEP NATCOM ROK and Sustainable Development Policy Institute, Islamabad Pakistan. (www.sdpi.org) partnership is considered to be SDPI's role to assist UNEP NATCOM ROK in the implementation of its program at national and sub-regional level in the Asia Pacific region. The partnership aims at strengthening common vision towards sustainable development through close collaborative activities in areas of common interests and to establish a relationship of mutual cooperation between the UNEP NATCOM ROK and SDPI, aimed at devoting special efforts to all the programs of the UNEP NATCOM ROK related to the environment, natural resources and sustainable development in Pakistan and in the region, especially South Asia.

Under UNEP NATCOM ROK and SDPI partnership, “Energy” is considered a priority area to work at and UNEP NATCOM ROK agreed to support SDPI project proposal entitled, “ Climate Change Adaptation: Introducing & Promoting Energy Efficient Technologies in the Flood Affected Remote Underdeveloped Rural Areas”

1. Background:

Climate change is a global phenomenon and a challenging reality for thinkers, planners, policymakers and professionals alike. It is a phenomenon that is likely to impact almost every sector of Pakistan's economy. Today it stands not only as a major environmental issue but also as a multi-dimensional developmental issue.

Climate change resulting from an increasing concentration of Greenhouse Gases (GHGs) in the atmosphere due to the use of fossil fuels and other human activities has become a major worldwide concern. Pakistan's total GHG emissions in 2008 amounted to 309 million tonnes (mt) of Carbon dioxide (CO₂) equivalent, comprising about 54% CO₂, 36% Methane, 9% Nitrous Oxide and 1% other gases. The biggest contributor is the energy sector with 50% share, followed by the agriculture sector (39% share), industrial processes (6% share) and other activities (5% share).

During the last century, average annual temperature over Pakistan increased by 0.6 C, in agreement with the global trend, with the temperature increase over northern Pakistan being higher than over southern Pakistan (0.8 °C versus 0.5 °C). Precipitation over Pakistan also increased on the average by about 25 %. Studies based on the ensemble outputs of several Global Circulation Models (GCMs) project that the average temperature over Pakistan will increase in the range 1.3-1.5 °C by 2020s, Furthermore, it is projected that climate change will increase the variability of monsoon rains and enhance the frequency and severity of extreme events such as floods and droughts.

Being a responsible member of the international community, Pakistan would like to contribute to the global GHG mitigation efforts without compromising on its basic minimum energy and food needs consistent with its socio-economic developmental requirements, energy security considerations, and financial and technological constraints.

A number of projects on energy efficiency improvement, energy conservation and use of decentralized renewable energy technologies being implemented by Pakistan Council of Renewable Energy Technologies (PCRET) and other organizations. The recommended measures for GHG mitigation include energy efficiency improvement at all levels in the energy system chain; energy conservation measures and use of energy-efficient devices.

2. Energy Efficient Cooking Stoves:

An energy efficient stove is a new technology that is replacing our traditional stoves. Traditional stoves are big threat to firewood consumption and forest degradation. Forest degradation is increasing day by day, women unknowingly consume more wood on open fire stoves by cutting more of wood from the forest. The constant wood cutting of the native, using as fuel is the major problem in our community. The reason is, they have not yet found any alternate to reduce this burden; therefore they are deliberately or un-deliberately cut wood for domestic burning but now we have solution for, in the shape of energy efficient stoves. To address this issue Energy Efficient stove is best solution.

These stoves have positive impact on community particularly on women because these smokeless stoves save them from many diseases particularly respiratory and asthma and will help in reducing environment degradation. The reduced use of biomass energy decreases carbon dioxide emissions that contribute to climate change. The project evaluation estimates that the use of fuel-efficient stoves with water-warming facilities in 2,500 households could reduce fuel wood consumption by 862,500 kg per month. This is equivalent to 10 tons of fuel wood per year, and 30 tons of carbon emissions avoided over a six-year product life.



For the present activity, both metallic EECSs (pictures above on left) and the metallic moulds for clay-made EECS (pictures above on right) were those developed and tested by PCRET and were manufactured by local blacksmiths in Islamabad, under the guidance and supervision of officials/resource person from PCRET & SDPI..

Although no studies of this impact are available, the reduced collection of fuel wood and other biomass should lessen pressure on local forest ecosystems. Reduced use of biomass in the home for cooking and heating improves air quality and lessens the risk of eye and respiratory problems, especially for women and children. Homes are warmer in the winter and overall have better temperature control. Women and children's workloads are lessened by reducing the amount of firewood that must be collected for cooking and heating.

The project also offers increased employment opportunities in the construction sector. Some entrepreneurs would be able to start their own businesses selling energy efficient cooking stoves (EECS).

The project takes a comprehensive approach to integrating natural resource management with the built environment. While introducing renewable energy technologies would also reduce carbon dioxide emissions and alleviate reliance on traditional biomass energy sources, the energy efficiency interventions promoted through this project may indeed have an equal or even greater impact on carbon dioxide emissions and livelihood improvements. One advantage this project would have is that it will use local materials and rely on local artisans who are already involved in housing construction; therefore, they may be able to easily integrate these techniques into their work.

Ensuring the widespread use of these efficient cooking and housing innovations is the ultimate goal of this project. It was therefore considered a right step in the right direction introduce and promote energy efficient technologies, like energy efficient cooking stoves (EECSs), for replacing the old traditional stoves, as due to enhanced use of wood, there is considerable degradation of forest in using the traditional stoves. The adaptation and

promotion of the energy efficient cooking stoves in the underdeveloped rural areas would help promote energy conservation and forests.

3. Project Objectives

The main objective of the project is to introduce and promote, the widespread use of the energy efficient cooking stoves among poor population of flood affected underdeveloped remote rural areas of Khyber Pukhtunkhwa. The project activities include community mobilization, awareness raising, training and material support for improving energy efficiency by promoting energy efficient technology.

4. Location

The selected project activities areas in Khyber Pukhtunkhwa were Tehsil Batkhela and Tehsil Dargai of Distt.Malakand (**Annex A**).

4.1 Malakand District

Malakand is a district of the province of Khyber Pakhtunkhwa in Pakistan. The District was formed in 1970 as a Provincially Administered Tribal Area. It had previously been a Tribal Area known as the Malakand Protected Area, part of the Malakand Agency. From 1970 to 2000 the District was part of Malakand Division.



Malakand District lies at a strategically important position as it acts as a gateway to Swat, Dir, Chitral and Bajaur. It is surrounded by a series of mountains that were overgrown with different kinds of trees in the past though they have a barren look today. The famous Malakand Pass which connects Mardan to Swat and Dir is located near Dargai. The Swat River flows through the District down towards Charsadda District where it falls into the Kabul River. Malakand District is bounded on the north by Lower Dir District, on the East by Swat District, on the south east and south west by Mardan and Charsadda districts respectively and on the west by Mohmand and Bajour Agencies.

The total area of Malakand District is 952 square kilometres (368 sq mi) and has a population density of 596 people per square kilometre. The population of Malakand is estimated to be

567,000 in 2004–05. Most of the people are Pashtuns speaking Pashto as their mother tongue. Agriculture is the major source of income, the total cultivatable land being 456,600 hectares (1,763 sq mi). There is also Sakhakot between Shergarh (Mardan) and Malakand district.

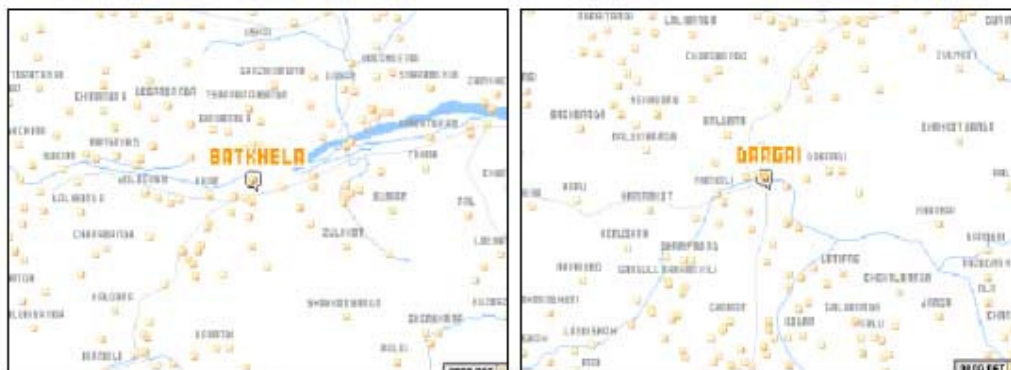
The soil of Malakand is loamy and moist, and is irrigated by the Swat River which flows from Swat, through Kohistan and joins the river Kabul near Peshawar. Malakand is surrounded by high mountains rich with mineral resources which are yet to be exploited. However, deposits of chromite iron, china clay and fuller earth have been found in Malakand. Agriculture is the main activity in the area and the important crops grown are rice, maize, millet, tobacco, sugar-cane, barley and grain. The famous fruits grown in this area are orange, kinos, grapes, apples, pears, strawberry and apricots.

Literacy rate of district Malakand ranges from 50-55%. There are numerous primary and high schools, besides 11 degree colleges for male and 6 for female in these two Tehsils of district Malakand. There are 18 basic health units and 8 dispensaries throughout district Malakand, beside 1 Tehsil district head-quarter hospital in each of the two Tehsils.

The district of Malakand is divided into two tehsils Dargai and Batkhela. The Batkhela and Dargai tehsils have 17 Union Councils, whereas Tehsil Dargai is consisted of 11 Union Councils.

4.2. Dargai Tehsil

Dargai is located on main highway from Peshawar to Swat, Dir and Chitral. Most of the tourists going to these areas had to take Dargai route, so business flourished in Dargai. Dargai is very famous for its Timber Market. There are rare scenic places and tourist resorts in Dargai like Jabban and Malakand hydro-electric project. Water passes through a three-mile long tunnel, and has a natural fall of 350 feet. There are two power houses at Dargai and Malakand Khas.



4.3. Batkhela Tehsil

Batkhela is the main tehsil and capital of Malakand District.. During the era of Ashoka and Kanishka, Batkhela was ruled by a leader named Butt hence the city has been given the name Batkhela. According to the 1998 census, the population of Batkhela is 38,222. Batkhela is a popular business city in KPK province. Batkhela main bazaar is more than 2 kilometers long. 100 percent of the households in Batkhela are Pashto-speaking. As business is main source of income, therefore, livelihood of people is mainly dependent on business. Batkhela is the main administrative and commercial town and district headquarters.

5. Project Partners and Activities

Project activities would be carried out in collaboration with Malakand District local non-governmental organization, Sahara Welfare Foundation (SWF) and Pakistan Council of Renewable Energies Technology (PCRET). We envisaged three main activities – awareness raising, training and material support on improving energy efficiency and promoting energy efficient technology, employing PCRET energy efficient cooking stoves (EECS).

5.1. EECS Awareness Raising

Awareness rising would be carried out with partners support. The target group would include males and also females, if possible. Around 2-3 workshops would be organized for the awareness of at least 40-60 participants from the local communities of 20 union councils in different parts of District Malakand .The awareness raising activity will focus on minimization of fuel consumption through EECS, display and distribution of awareness raising pictorial charts and demonstration of EECS

5.2. EECS Training

Two on the sites (Dargai & Batkhela) train the trainer training workshops (TTW) would be conducted for 20 trainees. 10 people would be trained in each workshop. Local residents, specially local blacksmiths would be trained to construct and assemble Energy Efficient Cooking Stoves (EECS). Training would be imparted on both the clay-made and metallic EECSs.

5.3. EECS Provision/ Material Support to Selected Households/Flood Affectees

100 Metallic EECSs and 20 Metallic Moulds for the construction of clay made stoves would be provided to selected flood affected households in 20 union councils of Malakand District through union council based stakeholder Committee. 5 Metallic Energy Efficient Stoves and 1 Metallic Mould for clay-made stoves will be distributed in each Union Council. Post project monitoring and EECS performance evaluation visits would be undertaken from time to time for six months

7.1.1.1 Inauguration:

The workshop was started with the recitation of Holy Quran by Qari Riaz Ghani . After recitation of the Holy Quran, Mr.Bakht Muhammad Chairman Sahara Welfare Foundation (SWF) introduced the guests and elders of the area. He welcomed the representatives from PCRET and SDPI for visiting the area and other participants for attending the workshop. Mr.Bakht in his welcome address explained the objectives of the awareness raising workshop and the benefits of the use of EECS in the remote rural areas of Distt. Malakand.

Mr. Fazle Wahid of SWF also welcomed the guests and participants for sparing their time to attend the workshop. He informed the audience that 60% of the household women in this area suffer from chest diseases due to smoke and gases emitted from the traditional stoves.

Mr. Sardar Ghani, Ex.Nazim Palai, in briefly described the background of the area. He also appreciated the efforts of SDPI and Sahara Welfare Foundation for conducting such workshops in the rural areas of Malakand, badly affected by terrorism and flood. He extended his full support for promoting the EECS in the area. Installation of irrigation tube wells and supply of clean drinking water were the other issues of concern in the area, he added.



Dr. Mahmood A. Khwaja, on the behalf of SDPI welcome the participants and appreciated the interest of the people for attending such Workshops/Seminars. He referred his meeting with Mr. Bakht Mohd (Chairman Sahara Welfare Foundation) in a seminar in Islamabad where brief discussions were made on the subject program which was later on materialized over period of time and fulfilling the necessary formalities. He also mentioned the similar activities in the rural areas of interior Sind and Besham district of Khyber Pukhtunkhwa, initiated by SDPI and carried out by local NGOs there.

He further explained the usefulness of the EECS, regarding its effect on the climate change, saving of wood, health impacts etc and added that proper training on the assembly of EECS, using a metallic mould and clay would also be given to the participants in the follow up training workshops in the area.

7.1.1.2 Technical Session:



Mr. Mumtaz Khan, initiated the technical session and described the hazards of the Old traditional stoves using wood, coal and rice husk, which may cause eye problems, Asthma and other diseases among the household woman and children, resulting from the emission of smoke & toxic gases. He also added that the EECS developed by PCRET are economical as there will be 50% of savings in wood consumption and as such the hazards of burning the wood and emissions of toxic gases will also be significantly reduced.

Moreover the provision of chimney in the EECS will also help to emit the hazardous gases and smoke out of the rooms and kitchens, he added.

Mr. Azam Ali Khan, Assistant Director PCRET described in details the importance of the EECS in the rural areas. He informed the audience that the villagers could assemble the EECS using a metallic mould and an mixture of clay, biomass and sand in an appropriate ratio and could start out their own business in the area by making & selling clay EECS using a metallic mould. He explained the benefits of the EECS and said that by using these stoves there will be less smoke in the kitchens. Moreover, there would be saving of wood and money (less purchase of wood) along with the protection from various air borne diseases caused due to emission of hazardous gases/smoke.

Mr. Azam further explained the working methodology and benefits of EECS with regard to economy and environment and specially the health of household women and children.. He added that by replacing the old traditional stoves by an energy efficient cooking stoves with chimney for venting the smoke out of the house can significantly contribute to the improvement of family health, fuel cost and reduction in green house gases emission.

7.1.1.3 Open Discussion:

At the end of the technical session, open discussions and question answer session was conducted. The participants raised different questions regarding the use and assembly of EECS which were answered by Dr. Mahmood A. Khwaja, Mr. Azam Khan and Mr. Mumtaz Khan. The participants were of the view that metallic mould of the EECS should be distributed among the villagers so that they could assemble the clay EECS in their houses. While responding to a query, Dr. Khwaja said that, one mould of EECS is sufficient for a village and the villagers can share the mould among themselves. Mr. Azam again explained the usefulness and benefits of the EECS and said that by using these stoves the household women would be protected from smoke and hazardous gases. He also added that more than 50% of wood would be saved by using the EECS as compared to the old traditional stoves.

Mr.Fazle Wahid informed the audience that 60% of household women suffer from chest diseases in this area, most probably due to emission of smoke and gasses by using the old traditional stoves.

The Ex. Naib Nazim of the area Mr. Sardar Ghani appreciated the workshop and urged that the use of EECS would be welcome and their use in the villages would be ensured. He also drew attention to other pressing issues of the area and requested for support to the flood affected people of the area, to revive plantation, drinking water and supply of sui-gas in the area. Dr. Khwaja requested for sharing of these suggestions through SWF for consideration by SDPI. Mr.Bakht advised the people of the area to save their money spent on fuel bills by using EECS. He also proposed for the formation of a committee on the basis of representation from the villages in the area for further follow-up of the EECS applications and the distribution.

7.1.1.4 Concluding Session:

In his concluding remarks Mr. Bakht Muhammad thanked the participants and proposed for the formation of a committee in the area for further follow-up of the EECS promotion and the distribution of material support for assembling EEC stoves.

Mr. Sher Muhammad (Ex Nazim) and Mr.Sardar Ghani (Ex Naib Nazim) also thanked the participants for attending the workshop and appreciated the efforts of SDPI and Sahara Welfare Foundation for conducting such workshop in the areas, badly affected by terrorism and flood. They also put forward the problems of re-plantation, installation of irrigation tube-wells and supply of clean drinking water for the area. They extended their full support for implementation of project activities and promotion of EECS in the area.

Dr. Mahmood Khwaja in his concluding remarks thanked the Ex. Nazim, Ex. Naib Nazim, social workers and all the participants for attending the workshop. He assured the participants that the awareness raising workshop would be followed by training and project implementation. He requested the participants to forward their suggestions through Sahara Welfare Foundation for SDPI consideration.

7.1.2 Awareness Raising Workshop Daragai

Venue: **Village Shingari, Union Council Badragga, Tehsil Dargai, District Malakand**

The second awareness raising workshop was conducted in village Shingari, Union Council Badragga of Tehsil Dargai, on 16th April 2011, where more than 80 participants belonging to 5 villages of the Union Council attended the workshop. The participants included students, teachers and social workers of the area (**Annex E 1 & 2**)



The workshop started with the recitation of Holy Quran by Qari Karim Khan. Mr. Fazle Wahid of Sahara Welfare Foundation welcomed the guests and participants for attending the workshop. He introduced the guests and elders of the area. He explained the benefits of EECS and its healthy impacts on the environment and urged the audience to start the use of EECS in their houses to save money spent on fuel bills and protection from smoke and hazardous gases.

Dr. Mahmood Khwaja of SDPI welcome and thanked the participants for attending the workshop. He also appreciated the efforts of Sahara Welfare Foundation for conducting such workshops in this area. He explained in details the objectives and activities of the project. The 2nd workshop on training about the use and assembly of the EECS will be conducted next month, he added. He also requested the audience to submit their proposals for improvement in the project activities, to SDPI through Sahara Welfare Foundation.

Mr. Sabir Hijazi, a social worker of the area, welcome the guests and appreciated the efforts made by Sahara Welfare Foundation and SDPI for conducting such workshops in the underdeveloped rural areas of District Malakand. He explained in details the energy crisis in the area during the operation against terrorism, followed by flood disaster which badly affected the socio-economic condition of the area. He hoped that by introduction and promotion of the EECS in the area would help in improving the household welfare and health of the residents in the area, as well as saving of the forest resources.

7.1.2.1 Technical Session:

The technical session began with the introductory remarks by Mr. Mumtaz Khan. In his presentation, he said that he himself belong to a village and knew the meager living facilities available in the villages as compared to the cities. He further stated that in the past, people were unaware regarding hazards of gases emitted from stoves. Due to media campaign and scientific research, the people have now become aware of the adverse health impacts of the emitted hazardous gases/smoke. He also informed the audience that

the EECS were more useful as compared to the traditional old stoves, as the hazardous gases emit through chimneys of EECS and lessen the health impacts as well as avoid wastage of wood. He also informed the participants that training to assemble metallic EECS and metallic



mould to prepare the clay EECS would be provided to those interested and wish to start business in this area by providing the same.

Mr. Azam AliKhan of PCRET described in details the benefits of EECS. He said that by using these stoves there will be little in the kitchen and the hazardous gases would be emitted

through a chimney fitted with the EECS and as such household women and children would be protected from chest, eyes and other diseases. He also informed the participants that training on the preparation of EECS with clay, using the indigenous materials would also be given to those interested.

He further informed that traditional stoves were a big threat to firewood consumption and forest degradation. He remarked that the continuous wood cutting of the forest and its use as a fuel was a major problem and the adaptation to energy efficient cooking stoves could be the best solution to this problem.

7.1.2.2 Open Discussion:

The participants raised different questions regarding operation, feasibility and usefulness of the EECS which were responded by the panelists and the technical resource persons. They took keen interest in the EECS and its benefits. In response to a question, Mr. Azam Khan informed that one mould of EECS was sufficient for a village households need and the villagers could share the mould in turn for preparation of mud EECS in their houses.

Mr. Fazle Wahid of SWF informed that the next training workshop on the use and assembly of clay EECS would be held after a month and hoped that the interest of the people would remain for the forthcoming training workshop. Mr. Azam also explained the preparation of mud EECS by using a mixture in appropriate ratio of clay, biomass and husk. He also informed the participants that they could start a small business of their own in the area, by promoting EECS and use in the houses.

7.1.2.3 Concluding Session:

Mr. Sabir Hijazi and Mr. Salim Khan, Social workers of the area appreciated the efforts made by Sahara Welfare Foundation and SDPI for conducting such workshops in the remote rural areas of district Malakand. Dr. Khwaja thanked the participants and the workers of Sahara Welfare Foundation, specially Mr. Bakht Mohd and Mr. Fazle Wahid for their untiring efforts in organizing the workshops. He hoped that other projects for the welfare of the people would also be started in collaboration with the Sahara Welfare Foundation. He requested the participants to submit their proposals / suggestions and feedbacks regarding EECS project activities, through Sahara Welfare Foundation for consideration by SDPI. The EECS were more useful as compared to the traditional old stoves, as the hazardous gases emit through chimneys of EECS and lessen the health impacts as well as avoid wastage of wood. He also informed the participants that training to assemble metallic EECS and metallic mould to prepare the clay EECS would be provided to those interested and wish to start business in this area by providing the same.

7.2 Training Workshops

The activity is aimed to train the selected local participants of the awareness raising workshops at Tehsil Batkhela and Tehsil Dargai, on the use and assembly of the Energy Efficient Cooking Stoves. 40 metallic EECS and 5 metallic moulds for the preparation of clay EECS were distributed among the selected households of the training workshops in each Tehsil. At site practical demonstration was also given on the preparation of the clay EECS using the metallic EECS moulds. More than 40 participants from each Tehsil who attended the awareness raising workshops received training on the use and preparation/assembly of the clay EECS.

7.2.1 Training Workshop, Batkhela

Venue: Village Bazdara, Union Council Palai Tehsil Batkhela, District Malakand

The first training workshop was conducted on 21st May 2011 in Union Council Palai of Tehsil Batkhela, where more than 40 participants belonging to 11 villages of the Union Councils attended the workshop. The participants included students, teachers, and social workers of the area (**Annex F 1 & 2**)

7.2.1.1 Inauguration

The workshop started with the recitation of Holy Quran by Qari Attaur-Rahman. The workshop was attended by 40 participants from 10 villages of Union Council Palai. In his welcome address Mr. Fazle Wahid of Sahara Welfare Foundation (SWF) thanked the guests and participants for attending the workshop. He referred to the awareness raising workshop conducted on 15th April 2011 in this Union Council which has now been followed by the scheduled training workshop and distribution of 40 EECS and 5 metallic moulds among the villagers.



Mr. Bakht Mohammad, Chairman SWF in his address also welcomed the guests and participants for attending the workshop. Mr. Bakht described in details that the present activity is a follow up of the previous awareness raising workshop conducted on

15th April 2011. The training program also included distribution of 40 metallic EECS and 5 metallic moulds for making clay EECS. He requested the people to make use of the EECS in their houses to save money spent on fuel bills and protect themselves from the smoke and other gases/smoke by using EECS. He also requested the participants that they should train the women in their houses in making clay EECS and emphasize upon them EECS benefits such as saving of forests/forest restoration, health and environment protection through the use of these energy efficient stoves. He remarked that small scale entrepreneurship could be developed on assembly of metallic and mud EECS in the area in the interest of the local residents.

Mr. Syed Sardar Ghani (Ex Nazim) of the area welcome the participants and also thanked the guests from SDPI, Islamabad for visiting and initiating the EECS project in the Malakand area. He thanked SDPI for conducting the training workshop and for the supply of EECS for distribution among the villagers. He also mentioned the various problems faced by the people of the area specifically supply of clean drinking water and installation of water hand pumps in the area to meet the requirement of drinking water in the entire area of the Bazdara Union

Council. He promised for the promotion of EECS in his area and ensured their use in the houses.

Dr. Mahmood Khwaja thanked the participants for attending the workshop. He stressed that women in the houses should be involved in the training activity and promotion of EECS. The women should also be informed regarding hazards of using the old traditional stoves. He also announced to contribute 10 more EECS to the area, as requested by the participants.

7.2.1.2 Technical Session:

Mr. Mumtaz Khan gave a brief of the proceeding of the awareness raising workshop conducted on 15th April 2011 and said that the activity was related to the training and demonstration on the preparation of clay EECS and distribution of metallic EECS among the residents of the area. He also added that a questionnaire form related to the function, merits & demerits of the EECS will also be distributed through SWF to the users of the EECS and the feed backs of the households using EECS on the questionnaire form would be highly appreciated.

7.2.1.3 Training & Demonstration:

Mr. Azam Ali Khan of PCRET practically demonstrated the preparation of clay EECS with the use of metallic mould. **Stepwise procedure (Annex G)** in Urdu for preparing clay-made EEC was also provided to the trainees. A mixture of mud/clay, biomass and husk mixed with water in an appropriate ratio was used for this purpose.



The participants of the training workshop took keen interest during preparation of the mud EECS and joined hands in the assembly/preparation of clay EECS. The participants also raised different questions at different stages of the preparation, which were responded by the technical resource person. Mr. Azam also informed that the fully filled up with the prepared mixture, the frame of mould was generally opened and removed after 24-48 hours. The dried up clay EECS could be transported easily from one place to another.

On this occasion a three members committee was also constituted for giving training to other villagers of the area on the preparation of clay EECS. The committee comprised of the local residents, Mr. Daulat Said, Zareen Bahaur and Ali Hussain who were nominated for this purpose by the participants.. The committee will arrange demonstration and training programs in different villages of the area and will send their feed backs to SDPI through Sahara Welfare Foundation.

7.2.1.3 Vote of Thanks:

Dr. Mahmood Khwaja in his concluding remarks thanked the Ex. Naib Nazim, social workers and all the participants for attending the workshop. He requested the participants to forward their feedbacks on the use and functioning of the EECS through Sahara Welfare Foundation to SDPI.



Training Workshop Dargai

Venue: Village Shingari, Union Council Badragga, **Tehsil Dargai, District. Malakand**
The second training workshop was conducted on 5th June 2011 in Union Council Badragga of Tehsil Dargai, where more than 40 participants belonging to 15 villages of the Union Councils attended the workshop. The participants included students, teachers, and social workers of the area (**Annex H 1 & 2**)

7.2.2.1 Inauguration:

The workshop was started with the recitation of Holy Quran by Qari Manzoor Ahmad. Mr. Fazle Wahid of Sahara Welfare Foundation in his address welcomed and introduced the guests and other participants of the training workshop. He referred to the awareness raising workshop conducted on 16th April 2011 in this area and mentioned that the present activity was aimed to impart practical training on the preparation of clay EECS to the participants. He also remarked that “World Environment Day” being celebrated throughout the world today i.e. 5th of June 2011 and the on-going activity, to promote energy saving and forest, was scheduled on the same day.. He mentioned the reasons for environmental degradation which include as forest degradation, industrial releases, wastes sites and lack of public awareness towards Environment Protection.



He requested the audience to make use of EECS in their houses so as to save energy, wastage of wood and protect themselves from various diseases caused due to use of the old traditional stoves.

Mr. Bakht Mahmud, Chairman SWF also welcome the guests and participants of the 15 villages of the union council. He also mentioned and explained the importance of the World Environment Day. He requested the participants to share the training on the preparation of clay EECS with other residents of the area, specifically women. He described the benefits of the EECS such as energy conservation, saving in fuel bills and protection against various diseases by using the EECS. He also requested the participants to send their feedbacks on the use and performance of EECS to SDPI through Sahara Welfare Foundation.

7.2.2.2 Technical Session:

Mr. Mumtaz Khan referred to the proceedings of the awareness raising workshop conducted on 16th of April 2011 and the benefits of the EECS such as the saving of wood and protection of health of children and women. He also mentioned the relationship of the present activity on training workshop with the world Environment Day. He further added that the introduction and promotion of EECS in the remote rural areas was an effort towards protection of Environment through the use of EECS, as their use in houses would lessen the wood consumption and the health impacts due to little smoke and toxic gases emission. With reference to the world Environment Day, he requested participants to keep the Environment of their houses, streets and villages clean with their own efforts. He also mentioned in details the environment pollution caused due to waste water, industrial and vehicular emissions.

Mr. Azam Ali Khan of PCRET mentioned in details the importance and benefits of EECS and said that by using EEC stoves there would be saving in wood consumption, protection of health from hazards of smoke and other gases and saving of time in cooking. He also explained the method and composition of the constituents used in the preparation of the soil mixture for EECS. The interested stockholders could also start small business in the area through the preparation and sale of clay-mud and metallic EECS, he added.



2.2.2.3 Demonstration and Practical Training:

Mr. Azam Khan demonstrated the preparation of clay EECS using a metallic mould. The participants contributed in its preparation and took keen interest in the activity. The prepared mixture of mud, clay, husk and biomass was used for this purpose. Mr. Azam explained every step of the clay-made EECS and answered the various questions raised by the trainees during on site practical training and demonstration on the preparation of clay-made EECS.

A four member committee comprising of local residents, Mr.Kamran Khan, Iftikhar Kahan, Mumhammad Saleem and Mr.Jamruz Khan was constituted by the trainees. The members of the committee were assigned to impart training to the people in the villages of the Union council and send their feedbacks in this regard to SDPI through SWF. **Stepwise procedure (Annex G)** in Urdu for preparing clay-made EEC was also provided to the members of the committee for distribution/use in training workshops.

7.2.2.4 Concluding Session:

Dr. Mahmood Khwaja in his concluding remarks thanked the chief guest Mr. Mohammad Ibrahim SDM, Tehsil Dargai for sparing his precious time to attend the function and for distributing the EEC stoves among the selected participants of the earlier awareness raising workshop. He also thanked the participants for attending and the officials of the Sahara Welfare Foundation for organizing the workshop.

Dr. Khwaja informed that more than eighty metallic EECS and ten metallic moulds for clay-made EECS have been distributed among the local residents of the two Union Councils of Tehsil Batkhela and Tehsil Dargai of Distt. Malakand. He further stated that promotion of EECS in this area will be useful to the residents in fuel saving, wood consumption and health protection, in addition to the environment protection and reduced GHG emissions. In the end he once again thanked the Chief Guest and participants for attending the workshop.

The workshop was concluded with a joint prayer (Dua) led by the Chief Guest.

7.3 Technology Support:



At the end of the training session in Tehsil **Batkhela**, forty EECS were distributed among the residents of the area. Dr. Mahmood A. Khwaja, Mr. Mumtaz Khan, Mr. Azam Khan, Mr. Bakht Muhammad, Mr. Fazle Wahid and Mr. Sardar Ghani (Ex Nazim) distributed the EECS among the villagers.

Five metallic moulds for the preparation of clay-made EECS were also handed over to Mr. Sardar Ghani (Ex. Nazim) for distribution among representatives of ten villages of the Union Council in Tehsil Batkhela, in consultation with Sahara Welfare Foundation.

After on site practical training and demonstration in Tehsil **Dargai**, forty metallic EECS were distributed among local residents of the area. Mr. Mohammad Ibrahim, SDM Tehsil Dargai was the chief guest on this occasion and kindly distributed the EEC stoves. Dr. Mohmood A.

Khwaja, Mr. Mumtaz Khan, Mr. Bakht Muhammad., Mr. Azam Khan and Mr. Fazle Wahid also participated in handing over EEC stoves to the local residents.



After distribution of stoves, the chief guest, Mr. Mohammad Ibrahim Executive SDM, Teh: Dargai addressed the workshop. In his address he recited the verses from Holy Quran (Sura-e-Anfal para 10) which describes that people should try their best to change their living conditions and that Allah will really help those people who intend to do so. He also mentioned the importance of forests and their rapid degradation due to terrorism and flood in the area and added that forests were great blessings of Allah and their protection was the responsibility of every citizen. He mentioned the importance of “Medicinal Plants” in Distt. Kohistan which were also badly destroyed by the last year flood in that area. He stressed upon the participants to use the EECS developed by PCRET and its importance regarding wood saving, safe-guarding house hold women’s health and saving of time and money.

8. Follow Ups, Conclusion & Recommendations

During the Awareness raising and Training workshops, the people of the area took keen interest in the energy efficient cooking stoves (EECS), with an understanding of EECSs benefits in improving the energy efficiency and good practice of promoting energy efficient technology, as well as saving of wood in their domestic use. The metallic moulds distributed in different villages of the Malakand district have also shown good results and the villagers after getting training on the preparation of clay-made stoves from the metallic moulds, preferred the clay-made EECS for their domestic uses.

8.1. Post EECS Project Survey, Monitoring and Evaluation

To assess post-training workshops follow ups, a brief and simple “Questionnaire,” (in national language – Urdu) of 10 questions was developed by SWF in consultation and support from SDPI. The questions were aimed at knowing EECS users responses regarding their experiences with the use, working, efficiency, wood consumption, SWF’s support and indoor air pollution. (**Annex I**)

Survey was conducted by SWF field staff at the sites and the questionnaire was distributed to participants of the awareness raising and training workshops from villages in Dargai and Batkhela Tehsils of District Malakand. Respondents generally replied to the questions in writing (English or Urdu), however, a few responses were verbal and recorded by SWF field staff. Respondent’s name, address and national identity (registration) number (NID), signatures or thumb impressions were also recorded.

In all 69 responses were received, both from villages of Dargai and Batkhela Tehsils of District Malakand. Majority of the respondents appreciated the functioning of both the metallic and clay-made EECS, lesser consumption of wood & time taken in cooking, easy handling and maintenance of EECS. They considered EECS use a positive approach towards saving forests and creating job opportunities through establishing small business in EECS manufacturing/supply small in the area which could be further motivated through bank or otherwise soft loan facility.

The respondents also appreciated the guidance & support of SWF and SDPI, with request for continuation and extension of EECS project in other areas of Malakand & Swat and also similar further initiatives for restoration of water supply, accessibility to clean drinking water and restoration of forest and agriculture/forestry in the area.

8.2. FEECS Project Sustainability

A four member committee in each Tehsil (Batkhela and Dargai) has already been constituted which will look-after the proper implementation of the post-project activities in the two Tehsils, including monitoring and evaluation of the installed clay-mud and metallic EECS further introduction and promotion of EECS in and other districts, surrounding Malakand. The committees will arrange demonstration and training programs in other Union Councils of the area and will send their feedbacks to SDPI through SWF.

The following post project activities, in other Union Councils of Tehsil Dargai and Tehsil Batkhela of District Malakand, have been reported by Sahara Welfare Foundation:

A training workshop was conducted at **Union Council KOT, Tehsil Dargai** on Aug 1, 2011 where 137 participants attended the workshop. As a result of this activity 29 clay-made EECS were installed in different villages of KOT Union Council.

A training workshop was organized in **Union Council Heroshah, Tehsil Dargai** on Aug 14, 2011. 176 participants attended the workshop. 23 clay-made EECS were installed in different villages of the Heroshah Union Council.

A training workshop was organized in **Union Council Kotakan, Tehsil Batkhela** on Sept 23, 2011 in which the number of participants was also 176. and 23 clay-made EECS were prepared by the trainees, belonging to different villages of the Kotakan Union Council.

8.3. Information Dissemination

At the end of the first training workshop in Malakand district, a panel discussion entitled **“Climate Change Adaptation through Promotion of Alternate Energy and Energy Efficient Technologies in Pakistan,”** was held at SDPI, Islamabad on May 02, 2011. Panelists/speakers were from SWF, Malakand, national integrated and development



association (NIDA), Besham, PCRET, national institute of electronics (NIE), EME and SDPI, from Islamabad. Senior adviser, Ministry of Science and Technology, Islamabad, chaired and conducted the proceedings of the panel discussion.

Experts and speakers of the seminar while highlighting the importance of alternate energy efficient technologies in climate change adaptation stressed the need to create awareness about changing climate scenarios, use of energy efficient devices, cut in fossil fuel consumption, reduction in green house emission, promote sustainable consumption and implement mitigation and adaptation strategies to cope with climate change and its negative impacts. Key recommendations (**Annex J**) of the panel discussion were:

To combat climate change it is necessary to **reduce reliance on fossil fuels**, cut short green house emission and incorporate mitigation and adaptation strategies, having particularly focus on energy (alternate and its efficient use).

It is strongly recommended to develop a **“National Climate Change Adaptation Program of Action,”** specific to all focus areas including energy.

Communities should be **encouraged to use Energy Efficient Cooking Stoves (EECS)** which is a new technology for climate change adaptation and a good replacement of traditional stoves, with higher consumption of wood and inefficient energy use. EEC stoves are cost effective, involves local material, can be mass produced and reduce a family’s fuel needs by upto 30-40 percent. They also lessens the risk of eye and respiratory problems, improves air quality, keeps homes warmer in winter, have better temperature control and reduces cooking time and the women and children’s’ workload of collecting firewood for cooking and heating.

Non-efficient use of energy resources by consumer is an area of concern for Pakistan. There is need to promote sustainable energy consumption by applying informative instruments like price incentives/ regulatory pressures (interventions), energy conservation, energy security, promotion of energy efficient appliances, awareness raising through media involvement and controlling the population growth rate.

Light Emitting Diodes (LEDs) panels should be promoted that have power efficiency of above 80% as compared to ordinary energy saver and mercury bulb (which when broken emits hazardous and toxic mercury vapors).

Establishment of community level biogas plants be encouraged in our villages and countryside to reduce dependence on fire-wood and natural gas for domestic cooking and heating.

Cultivation of oil rich plants like mustard, jatropha and rapeseed should be increased and bio-diesel production and consumption should be initiated to decrease dependence on imported petroleum in transport sector.

Ethanol production from molasses should be expanded for blending with petrol and diesel to reduce our dependence on fossil fuels.

Use of solar energy for industrial, commercial and domestic water heating should be encouraged. Also research on electric vehicles be initiated R & D institutions and Universities/technical colleges

It should be mandatory for energy intensive sectors in the country to get their “**Energy Audit**” conducted by accredited energy auditor.

Formation of a “**Bureau of Energy Efficiency**” (BEE) is highly recommended to immediately start application on energy conservation

All power projects may provide 0.1% of the project cost towards improving **engineering education in energy related disciplines** in the universities.

The panel discussion/seminar recommendations were also shared with the officials of the relevant ministries, Government of Pakistan and well covered by press media.

Project activities were highlighted through seminar/panel discussion, support reading material, press releases and media reports, both in English and the national language – Urdu (**Annex K**).

8.4. Conclusion and Recommendations.

The initiative of providing the residents of Makakand with simple and affordable EECSs, was well taken and appreciated by the population at the project sites. As a result of EECS project activities, more than two hundred people of the area including students, teachers and social workers attended the awareness raising and training workshops conducted in the two Tehsils of district Malakand,. The participants appreciated the efforts of SDPI and SWF for conducting such workshops in the remote rural areas of district Malakand.

Demonstration and distribution of EECS to the poor villagers of the area were also greatly appreciated. The widespread use of EECSs would help in safeguarding the health of the household females and children in the area. Job opportunities have also been created as a result of EECS project activities by establishing small-scale business in manufacturing and supply of metallic and clay-made EECS in the area.

Self-help and female involvement were promoted through local coordinators and SWF female field workers. The training of local residents was carried out with “Train the Trainer” approach. Local language of the area was mostly used, both in the awareness raising and training workshops at the sites, which enhanced active participation and interaction with the participants.

Press coverage was given to these activities in the local and national newspapers (both in English & Urdu) and internet which enhanced focus and raised awareness regarding energy efficiency and consumption issues. In collaboration with other relevant institutions a seminar/panel discussion on these activities was also conducted on 2nd May, 2011 at SDPI, in which eminent scientists and technical experts shared their views on climate change and energy issues.

Efforts of SDPI for implementing the project, coordination of SWF, technical inputs of PCRET and cooperation of the local administration were the factors responsible for the success of the project. Conducting the project activities in the far-flung and security risked areas were the factors, on times, responsible for affecting the project progress.

In addition to the to the seminar/panel discussion, project specific recommendations are described below:

Continued awareness raising and training workshops should be organized in other Union Councils of the area.

Household women should be further involved, with support from female fieldworkers/staff of SWF and other local organizations in the training and EECS demonstration sessions of the workshops, if the project activities are extended. Educated females should be trained to impart training to the house-hold women within the house premises in the area.

The number of EECS, specially the metallic mould for making clay-made EECS be increased.

The project activities should also be extended to other remote, under developed and flood affected areas of Khyber Pakhtunkhwa.

Short-term loans to the people to start their business to supply and manufacture EECS and the metallic moulds may also be facilitated to promote business facilities.

Integration of business partners be looked for material supply for EECS manufacturing in remote rural areas..

Research and development work be taken up for assembling low-cost EECS and smooth and efficient emission of smoke and hazardous gases through EECS chimney.

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