Water, Climate Change and Forests Teaching Beyond Boundaries through SNOW

Prepared By: Society for the Protection of Nature in Lebanon 2014

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List of Acronyms

- **EIC** (Environment Information Center)
- GEF (Global Environment Facility)
- GHG (Greenhouse Gases)
- IBA (Important Bird and Biodiversity Area)
- **IUCN** (International Union for Conservation of Nature)
- KBA (Key Biodiversity Area)
- **LEF** (Lebanese Environment Forum)
- Med NGO Network (Mediterranean NGO Network for Ecology an Sustainable Development)
- MedWet (The Mediterranean Wetlands Initiative)
- MoE (Minister of Environment)
- ROWA (Regional Office for West Asia)
- **SEARCH** (The Social, Ecological, and Agricultural Resilience in the face of Climate Change)
- **SNOW** (School with NO Walls)
- **UNDP** (United Nations Development Programme)

I. General Background

1. About SPNL

Society for the Protection of Nature in Lebanon - SPNL is one of the oldest environmental NGOs in Lebanon. It was established in 1983 under the Lebanese Laws, and licensed by the Ministry of Interior by decision no. 6/AD dated 8/1/1986.

SPNL is a national, non-geographic, non-sectorial, non-political environmental NGO. It is the national partner for BirdLife International in Lebanon. SPNL considers birds as entry points for the conservation of wider natural resources, as they act as key indicators of the status and health of ecosystems. It is a member in IUCN, MedWet, Med NGO network, WANA Forum, and a founding member of the Lebanese Environment Forum-LEF. Moreover, SPNL has a long experience in scientific research (mainly avifauna and biodiversity), education and awareness, advocacy and networking, and community based development.

SPNL's mission revolves around the protection of nature, birds and biodiversity of Lebanon for people, and the promotion of sustainable use of natural resources for people and with them.

Ever since its establishment in 1986, SPNL advocated the establishment of protected areas and initiated with the Ministry of Environment the protected areas in Lebanon. After twenty years of experience working with nature reserves through government agencies, SPNL is now reviving and advocating the Hima (الحمى) community based conservation approach that has been prevalent in the Arabic region for more than 1500 years. This approach concentrates on the involvement of local communities in decision making, promotes sustainable use of natural resources, and supports poverty alleviation through providing alternatives for income generation.

SPNL is merging the traditions and values of the Hima approach with the modern scientific techniques, such as identification of ecological sites, stakeholder analysis, and using participatory approaches for involving the local communities from the visioning, planning, and implementation.

As a national environmental NGO in Lebanon, SPNL has widely contributed to both raising awareness on environmental issues and concretely protecting natural areas in Lebanon. As a member of the International Union for Conservation of nature (IUCN), SPNL has helped develop the first biodiversity project in Lebanon, known as the Protected Areas Project. SPNL has established the Environment Information Center (EIC) that serves as a key resource for the provision of environmental information to students, teachers, and researchers in this field and is currently developing the School with No Walls-SNOW program that promotes extracurricular activities with school children through "learning by doing" especially in the IBAs and Hima sites.

Special Assets:

- SPNL is the BirdLife partner in Lebanon with wealth of information about birds, migration, flyways, in addition to resources through BirdLife International partnership, and other regional and international networks.
- SPNL is a leader in reviving the Hima community approach for conservation of natural resources, empowerment of local community, and raising the quality of life through economic opportunities.
- SPNL has long experience in following up the hunting problem in Lebanon & the region. Furthermore, SPNL has extensive experience in producing awareness material on sustainable hunting, and providing capacity building workshops.
- SPNL is representing the conservation NGOs on the Hunting Higher Council due to its credibility in this regard (that sets the application decrees for the hunting law in the country).
- SPNL has strong contacts with ministries, municipalities, hunters and hunting organizations.
- SPNL has strong experience in developing awareness material, and providing capacity building workshops, trainings, conferences etc...
- SPNL has experience in site field research, participatory approaches for community involvement, and development of site management plans.

2. SEARCH project

The Social, Ecological, and Agricultural Resilience in the face of Climate Change (SEARCH) project, is a three years regional project working in five countries (Egypt, Morocco, Jordan, Palestine and Lebanon) funded by the European Union, to develop and pilot ways to aid communities in combating climate change through a process of participatory planning. SEARCH is a partnership consisting of 13 partners aiming to increase joint learning and community climate change resilience by demonstration sites and development activities.

The "SEARCH" project is implemented in Lebanon by two non-governmental organizations, SPNL and MADA, in partnership with the International Union for Conservation of Nature- Regional Office for West Asia (IUCN/ROWA). In Lebanon, the project is being implemented in the Upper Akkar watershed located in the North Governorate. This region is a critical and unique zone harboring various natural ecosystems and habitats delineated by changes in types and structures as well as differences in human impacts caused by discrepancies in livelihoods and exploitation of natural resources by local communities.

The project concentrates on three study villages, namely: Qobayat, Andeket, and Aydamoun-Karmchbat that are located in the Upper Akkar area. This area is known to be very sensitive to climate change and other drivers of change.

Pilot project implementation

The final phase of the SEARCH project focuses on the implementation of pilot projects as a result of the social and ecological vulnerability assessments that were conducted in the earlier phases of the project. The assessments presented Aydamoun- Karmchbat as the most vulnerable area when compared to Qobayat and Andeket and thus, needs urgent support. In this regard, the implementation of the pilot projects took place in this village (SEARCH Vulnerability Assessment, 2013).

The SEARCH project initiative was based on a participatory approach bridging the gap between local and national stakeholders. From the initial phases of the project, SEARCH focused on working with the local communities in Upper Akkar to build their capacities, raise awareness and teach them about climate change related issues that are affecting livelihoods. Thus, the implementation of the pilot projects were done in consolidation with the head of the Jaafar tribe as well as the

local community.

The first project targeted the rehabilitation of two old water tanks and their networks in the village of Rwaiymeh (in Karmchbat area) in addition to the installation of a new plastic water tank so that water will reach all households in the village even the ones located at higher levels than the old water tanks (**Figures 1 and 2**). This helped address the issue of water shortage and improved the quantity of water available for both potable and agricultural usages. Moreover, two smaller activities were implemented; the first was providing the local women with utensils to produce dairy products; and the second included supplying local men with beehives to produce honey to sell. These activities were seen as enhancing the livelihoods of the locals by creating alternative sources of income.

Suggested Solutions

After the pilot projects were successfully implemented in the study area the local community were perceived to possess limited knowledge and awareness about water-use, water conservation, forestry and climate change. The misuse of natural resources (including water and forest) was highlighted as the major problem.

All this has been identified in consolidation between the local and national committees, where all stressed the need to raise awareness of the local community in relation to climate change, water and other environmental issues.

In order to fill this knowledge gap, another pilot project was suggested in the frame of the SEARCH project which resulted in the development of an educational program for Hima Upper Akkar as well as an educational booklet. The program aided to provide awareness, education and training on climate change water related issues, and forest conservation through conducting training workshops, outdoor activities, presentations, and much more. In addition, the material used and the lessons learned were documented in the following developed educational booklet. The educational program focused on the main environmental features present in Hima Upper Akkar. The program targeted the local community who directly affect the management of the water resources and forest including women, children, and farmers. The objective is to raise their awareness on sustainable water management practices (quality and quantity), including negative anthropogenic effects. In addition, improving their knowledge on climate change and its correlation with their natural environment (water and forest) and their livelihoods. The recommended program is expected to complement the work implemented in the previous pilot

projects and provide an added value to the success of the SEARCH project. The educational program was initiated through a training workshop that built on what has already been done through the pilot projects in the area thus building the capacities of the locals for the future, extending beyond the SEARCH project. The training workshop took place in the Upper Akkar area and targeted the local community including women, children (8-12 years) and farmers in the three study villages of Qobayat, Andeket and Aydamoun-Karmchbat.



Figure 1: SEARCH project implemented in Rwaiymeh-Upper Akkar



Figure 2: Rehabilitation of old water tank in the village of Rwaiymeh-Upper Akkar

3. SNOW program

The SEARCH educational program was developed through the School with No Walls (SNOW) program that SPNL is implementing in the 14 established Himas of Lebanon. The SNOW program aims to spread awareness and education about natural resources through indoor and outdoor hands-on activities "Learning by doing" approach, thus reviving the positive relation between human and nature. The program takes into consideration that learning is a life-long process, acquired by actual experiences.

SNOW is a hands-on program which promotes:

- Learning through fun
- Team building and capacity building
- Interactive approach for learning
- Community bonding
- Leadership and communication skills
- Valuing nature
- Life-long educational experience

The SNOW program promotes an innovative concept in the region which challenges the traditional teachers' approach and provides children with new methods to educate about nature and the environment.

The SNOW program targets rural children between the ages 8-12 and aims to raise awareness about the Hima, IBAs and KBAs, species and ecosystems. The SEARCH educational program focused on the need to empower local communities by building their capacities through training and awareness on climate change, water related issues, and forest conservation.

This project also aims at developing a new way of thinking for linking people to their environment. The strength of this program is that it is adaptable to different age groups and genders; this was illustrated throughout the SEARCH educational workshops where knowledge and awareness were disseminated not only to children, but also to women, and farmers who make up the majority of the Upper Akkar local community. The same activity was adopted for both women and children with the same learning outcomes by simply using different approaches. Moreover, this provided the opportunity for women and children to collaborate to reach the same learning outcome. These attributes highlight the flexibility and adaptability of the SNOW program.

It is crucial to highlight the importance of education to change the behavior of the new generation, who are the future decision makers, on the conservation of ecosystems.

The educational workshop provided through SNOW program will help the local community retain the information and knowledge on water and climate change related issues even after the SEARCH project has ended. Through the direct experiences provided by the workshop activities, the targeted groups will have the chance to benefit from the knowledge and skills acquired and apply them in conserving the environment. This highlights the sustainability and durability of the knowledge and experiences learned even after the SEARCH project has ended.

Planning and Activities

The SNOW program is planning to cover specific interactive outdoor activities which help people to explore nature through fun, such as hiking, bird watching, exploring cultural and natural sites, as well as interactive trainings and workshops. Whenever feasible, the school curricula will be linked to the activities implemented. The SNOW program will be initiated in one or two Himas in order to then target all the other Himas in the near future.

List of suggested special activities in relation to the SEARCH project:

-hiking and trekking
-biking, rope courses, caving, climbing (adventurous activities)
-visiting cultural sites

- -tree planting
- -birdfeeders activity
- -team building games
- -conflict resolution activities
- -leadership development activities
- -water related activities
- -camping overnight
- -archery
- -clay and chalk molding
- -farming
- -bird watching

Target groups

- -Children 8-12 years
- -Teachers, educators and parents
- -Schools
- -Women
- -Farmers
- -Local communities



Figure 3: SNOW Program Activities

The aim of this educational booklet is to increase knowledge and raise awareness on water related issues, climate change and forest conservation in the Upper Akkar watershed. This area is of great importance due to its breathtaking landscape, varied biodiversity, and vast forest cover. Moreover, this area is highly sensitive to climate change impacts at the social, agricultural and ecological levels; and thus needs special attention.

The development of this educational booklet is of great importance as it will target the local community including women, children and farmers who are seen as the most sensitive and influential groups. These users will acquire the knowledge, skills and tools needed to address water issues, climate change impacts and forest related issues. Women, being the house keepers, will learn to manage and conserve water at the household level, adapt to climate change and learn best practices for forest conservation and agricultural management. Children, being the young generation and future leaders will learn how to appreciate their natural environment and gain the needed skills to conserve water, as well as they will learn to adapt to and mitigate climate change impacts and guide in forest management and conservation. Farmers, being the food producers, will understand the linkage between climate change and their livelihoods (including agricultural diseases linked to temperature variations) and learn how to adapt to climate change stresses, through using sustainable agricultural practices, including types of crops, water management approaches and technologies.

This booklet can also be used as a guide for teachers who will learn the approaches used and apply them with their students. The implemented activities focus on the main learning outcomes. This interactive way of teaching is the core of the booklet and the SNOW program, which was adapted to fit all members of the local community including children, women, and farmers. This highlights the flexibility of the program where no age limit, gender or any other limiting factor can interfere with the learning process.

5. Water

The importance of protecting water resources cannot be overstated. The quality, quantity and economic problems faced as a result of water exploitation are complex but, at least one of the causes of these problems is easy to manage --water losses. And, the solution is straight forward -- water conservation.

Simply stated, water conservation means doing the same with less, by using water more efficiently or reducing where appropriate, in order to protect the resource now, and for the future. Using water wisely will reduce pollution and health risks, lower water costs, and extend the useful life of existing supply and waste treatment facilities. According to Mintz et al. (1995), simply by changing the way people use water, and teaching sustainable ways to conserve it, water consumption at the household level can be reduced by 40% or more. In the agriculture sector, a sustainable and apt way of irrigating can reduce water losses up to 80% and improve crop productivity at the same time (Frenken, 1997, chap. 7).

Moreover, enabling communities to use water in a sustainable way is therefore fundamental to protect the limited water resources available.

6. Climate Change

Global climate change is an immediate and important issue that must be addressed. The effects of climate change - rising temperatures and sea-levels, shrinking glaciers, changes in range and distribution of plants and animals, changing precipitation patterns, and more intense heat waves are likely to worsen if countries do not reduce their greenhouse gases. Climate change affects people and sectors in several ways. Agriculture is affected because the crops that are grown for food require specific conditions to thrive, including the right temperature and ample water, in which changing climate could affect those aspects.

Climate change is affecting where, when, and how much water is available for people to use. Rising temperatures, changing precipitation patterns, and increasing droughts will affect the amount of water in lakes, rivers, and streams, as well as the amount of water that seeps into the ground to replenish ground water (Alley, Reilly and Franke, 1999).

Forests provide homes for many kinds of plants and animals. They protect water quality, offer opportunities for recreation, and provide people with wood. Forests are sensitive to many effects of climate change, including shifting weather patterns, drought, wildfires, and the spread of pests.

7. Forests

The conservation of forests is important because they cover several fundamental functions in the environment. Forests act as water reservoirs, thus protecting water resources. Moreover, through their foliage craggy bark and abundant litter, trees and forests decrease the speed of water dispersion and favor slow but total infiltration of rainwater; particularly in dry areas, in which trees retain a very important function in their capacity to retaining mist and storing it.

The forest canopy slows down the wind while its dense network of roots holds the soil in place; added to the buffering function of the water flow, these characteristics protect against wind and water erosion, land movement (mass slides and falling rocks) and, under cold climates, the risk of avalanches. With the combination of slower water dispersion and percolation to phreatic and intermediary water tables, the forest exerts an important buffering effect that protects against flooding or severe river bank erosion (Gottle and Sène, 1997).

Moreover, through the control of wind velocity and air flows, the forest influences local air circulation and may thus retain solid suspensions and gaseous elements; it can filter air masses and retain contaminants. The forest exerts a definite protective effect on neighboring human settlements and crops in particular. This capacity is useful in the protection of inhabited areas that adjoin industrial zones and urban forestry in general.

Finally, the forest offers a habitat to flora and fauna and, depending on its health, vitality and ultimately the way it is managed or protected; it secures its own perpetuation through the functioning of the forest ecological processes. In Europe, almost half of the ferns and flowering plants grow in the forest. Owing to its size and structural diversity, more animal species are found in the forest than in any other ecosystem. (Gottle and Sène, 1997).

II. Background of the Upper Akkar region

Akkar is located in the far North of Lebanon, with the Mediterranean Sea on its western border, Hermel to the east, Syria to the North and Bared River and the district of Minieh-Dinnieh to the south . It has a total surface area of 798km². Akkar is characterized by the presence of high mountains to the east and a relatively large coastal plain to the west, which makes it the second largest agricultural plain in the country in size and importance after the Bekaa. The area is distinguished by its natural and cultural values in which it possesses vast forest, springs and rivers. Furthermore, it is characterized by a typical rural community that highly depends on natural resources. Those facts add to the vulnerability of this region to climate change impacts (Thomas, Khawlie, Kawass, & Cadham, 2004).

The Governorate of Akkar is characterized by beautiful natural landscapes and rich biodiversity. It is home to the largest green reservoir in the country as well as other important water resources. Akkar offers a dazzling array of landscapes, from the long coastline and agricultural plain in the west to the wild valleys (Wadi Jahannam), caves, cliffs and rocky scenery in the east. The Qammoua region boasts many varieties of forest, including junipers, cedars, turkey oaks, pines and more. The densest turkey oak forest in Lebanon is located in Fnaidiq. There is great potential for eco-tourism in Akkar (Thomas, Khawlie, Kawass, & Cadham, 2004). Figure 4 shows the geographical location of Akkar in relation to Lebanon.



Figure 4: Geographical location of the SEARCH area of study in Lebanon



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Figure 5:Forest of Andaket-Upper Akkar

Unfortunately, a combination of factors including lack of environmental awareness, bad basic infrastructure, and poverty are posing a threat to the region's environment. Several areas are being threatened by overgrazing of livestock, logging, forest fires, and urban development. The excessive use of chemicals in agriculture and the poor handling of sewage and solid waste, resulting in uncontrolled dumping, lead to the pollution of soil, underground water resources, rivers and the sea.

Studies reveal that Akkar is one of the most deprived regions in Lebanon, with the highest overall poverty rates in which 63.3% of the families in the region are living in poverty (Socio-Economic Situation in Akkar in Light of the Crisis in Syria, 2011). In addition, Akkar has the lowest average individual income level where 22.7% of the individuals and 16.6% of the households in Akkar live on a monthly income of less than US\$40, compared to a national average of 6.3% for individuals and 4.5% for households. Moreover, 73.1% of individuals in Akkar live on less than US\$107 per month, versus 38.9% in Lebanon. Akkar also suffers from having the highest illiteracy rate in Lebanon (30.5% for both sexes). The Governorate of Akkar is characterized by lower educational achievement as compared to national averages. The records for enrollment rates at most educational levels are low mainly at the secondary and university levels, where it has registered the lowest in Lebanon. Akkar also has the highest rate of schooling delay and the highest rates of dropout. This is mainly due to the fact that education costs are high for the

parents including schooling, transportation and other fees (Preliminary Master Plan for Upper Akkar/Hermel Region, 2012). The local community relies mostly on agriculture as a source of income where more than 60% of the population is involved in agricultural practices. Also, a large number of men work with the Lebanese army. The women usually stay home where they do household chores and take care of their children. However, this is particularly changing in the village of Andeket where educated women are increasingly holding jobs as school teachers. They are also becoming more involved in the community as they have formed a women coop (Preliminary Master Plan for Upper Akkar/Hermel Region, 2012). Preventing further deterioration in Akkar's natural environment requires a multi-prolonged approach. Efforts should be made to improve sewage and solid waste management and raise awareness on environmental issues. It must be noted that, given the poverty and the often limited options available to people in this region, simply prohibiting certain polluting practices will not be effective. Environmentally friendly alternatives must be provided. There is also a need to provide an adequate legal framework to protect the rich natural sites of this region. Akkar's mountainous region has been recognized as highly important in terms of its biodiversity and aesthetics. The Ministry of Environment has declared Karm Chbat as a nature reserve in 1995. Further, in 2004, the Council for Development and Reconstruction identified it as a unique Natural National Park (NNP) among seven parks "to be", six of which are intended as regional parks. Local municipalities and government agencies are now involved in the process of creating this NNP, but both the legal framework and modalities of management have yet to be defined (Preliminary Master Plan for Upper Akkar/Hermel Region, 2012).



Figure 6: Forest of Karm Chbat- Upper Akkar

1. Water Resources in the Upper Akkar Region

The Upper Akkar region is characterized by a mild Mediterranean climate, with an average rainfall of 700mm/year and a mean temperature varying between 12°C and 28°C. However, Northern-Western winds are predominating. Rivers and springs represent the major sources of water present in the area. The basin of the El-Kabir El-Janoubi River, which is a common water course between Lebanon and Syria, represents a major water resource for this region. However, this watershed is under severe stress, due to the increasing pressure from both countries. Those pressures include unsustainable use of water resources for agriculture, population growth and inadequate infrastructure for solid waste, wastewater and domestic water. All these pressures combined intensify the stress on water resources, where the river suffers from the deterioration in its water quality. Adding to all these, is the effect of climate change which produces unpredictable and inconsistent precipitation patterns along with increased occurrence of severe rain and a more extended dry season (Preliminary Master Plan for Upper Akkar/Hermel Region, 2012).

Akkar is rich in water resources, having numerous springs and huge underground lakes, such as in Joumeh. Nevertheless, it ranks last in Lebanon in terms of residential connections to and accessibility of the public water supply, with only 53.8% of the houses connected versus a national average of 85.5%. Some 20.9% of the houses in Akkar have no running water whatsoever, while the remainder depends on either artesian wells or private water networks. Many existing networks date back to the 1960s and 1970s, with little or no upgrades or maintenance. There are widespread water shortages, especially during the summers. The absence of a decent public water supply has led to uncontrolled digging of artesian wells, negatively impacting water tables and, in some cases, drying up springs (i.e. the region Al-Dreib al-Awasat) (Preliminary Master Plan for Upper Akkar/Hermel Region, 2012).



Figure 7: Water resources in Upper Akkar

In the Akkar region, as in nearly all Lebanon, the plodding effects of climate change are aggravated by anthropogenic pressures on natural resources (water wastage, unsustainable agricultural practices, overgrazing, abusive logging, intended forest fires, uncontrolled urban sprawl, etc.) hence increasing their vulnerability. In view of these existing pressures, future expected climate trends will mainly exacerbate the consequences. This situation will definitely increase natural resources vulnerability by impeding their intrinsic resilience capacity towards any given human or natural incident that might lead to their eventual progressive demise (MoE/GEF/UNDP, 2011). Initiating an oriented strategy for adaptation is thus needed to influence the barriers and the time direction of natural processes in order to mitigate the socioeconomic and environmental costs of degradation that would be intensified by climate pressures (**Figure 8**).



Figure 8: Effects of climate change in Upper Akkar

Some of the reported unsustainable community based practices include:

- Forest exploitation through illicit logging (**Figure 9**), overgrazing in highly vulnerable areas, uncontrolled harvesting of medicinal and aromatic plants, hunting, unmanaged recreational activities, agricultural encroachment on forested areas, etc.
- Mismanagement of water resources (wastage, illegal wells, unsustainable irrigation practices, etc.)

- Unsustainable land exploitation (misuse of pesticides and fertilizers, quarries, etc.) leading to the deterioration of soil assets

The above mentioned factors have resulted in:

- Water shortage and mismanagement of water resources leading to conflicts between stakeholders on local and regional level.
- Destruction of forests and valleys due to land reclamation for agricultural purposes, grazing, urbanization, and forest fires.
- An increased dependence of poor communities on agriculture and grazing due to the absence of sustainable alternative income generating activities

Studies reveal that the total emissions in Lebanon in the year 2000 are estimated at 18.5 million tones, which show an increase of 2.77% per year since 1994. Results show that the emissions from forestry, agriculture and land use change represents 6% of the total CO_2 equivalent. Although these GHG emissions in Lebanon are quite insignificant at the global level, the impact of climate change on Lebanon is huge especially in the fields of forestry and agriculture. The PRECIS model shows that the temperature will increase by 1°C on the coast and 2 °C in the mainland by 2040, and will increase 3.5 °C on the coast and 5 °C in the mainland by 2090. Moreover, rainfall is expected to decrease by 10-20% and 25-45% by 2040 and 2090 respectively (MoE/GEF/UNDP, 2011).



Figure 9: Logging in Karm Chbat forest

3. Forest cover in the Upper Akkar Region

Upper Akkar Mountains are covered with forests of Lebanese Cedar trees, and Greek Juniper, in addition to the presence of rocky slopes and grasslands for grazing. It is known to have the highest forest cover of 21% in comparison to 13% average in the whole country. This region is characterized by its high biodiversity (fauna and flora), by which there are at least 500 plant species, unique animal species such as the Persian squirrel and a huge number of birds (about 134 species) including the Syrian Serin that is globally threatened with extinction. This area is the first entry point for soaring bird migration into Lebanon (MoE/GEF/UNDP, 2011).

Actually, the impact of climate change on forest ecosystems in Lebanon was developed in a previous assessment by overlaying the derived forest map and the grid map (25 x 25 km) as well as the bioclimatic levels in Lebanon (MoE/GEF/UNDP, 2011). This study featured the grids where the shift in bioclimatic level will surpass the ecological tolerance of the dominant forest type. The Upper Akkar region was as a result highlighted to be one of the most vulnerable areas to climate variability, where the shift in bioclimatic level will challenge the survival of the species (**Figure 10**). *Cedrus libani, Abies cilicica, Quercus cerris* and *Juniperus excelsa* stands have also been identified as having the lowest natural adaptive capacity to current and future climate trends.



Figure 10: Areas (red circles) expected to be the most impacted by climatic factors (Source: MoE/GEF/UNDP, 2011)

III. Target population

This educational booklet focuses on three main users that include women, children and farmers. It will show how the same learning material and activities can be applied to all groups by using different approaches, but with the same learning outcomes and objectives.

1. Women as a target group

It is important to target women because they are the housekeepers and thus users of water at the household level. Moreover, women are the ones that deliver messages and teachings to their children. Thus, the more knowledge and awareness women have, the more they are able to clearly set a good example for their children and act as water conservation role models. This educational booklet will allow women to learn through an interactive approach allowing team spirit and a sense of community belonging to emerge in each of the participants (**Figure 11**).



Figure 11: women community members

A. Water Resources

Tackling water related issues with women as a target group is crucial since women use large amounts of water at the household level. Thus, raising awareness on proper management and conservation of water will teach women how to save water while doing household chores such as dish washing, cleaning, laundry, showering and much more (**Figure 12**). They will also be exposed to the water cycle and learn how water changes phase between solid, liquid and gas and how water moves through a cycle that is constantly being regenerated.



Figure 12: Local Women learning about water management

Water Related Activities a. Wash a Dish Activity

This activity engages two women in a dish washing competition. Each woman will have a set of 4-5 dishes to wash using a minimum amount of water with optimal cleaning results. Each woman will be given 2 buckets filled with water, a sponge and dish washing soap to clean her dishes. The one that wastes the least water while cleaning her dishes will win the challenge.

Outcomes

The objective of this activity is to understand the importance of water conservation through the proper use of water resources. This activity shows the importance of saving water while doing household activities especially for women. It also promotes the use of buckets for washing chores instead of having running water that leads to water wastage. From this activity, women will have a hands-on experience when it comes to water conservation that will allow them to realize the quantity of water you can save adopting proper cleaning methods at the household level. As a result of this activity, women are expected to better understand the importance of saving water at the household level.

Material needed:

-plastic buckets -big plastic bowls -water -bio-degradable dish washing soap -sponges -dishes

b. Half-pipe Activity

The half-pipe activity should be done in open air. In this activity two teams will compete to transport water with minimal wastage. The teams will be provided with ten half-pipes each; they will position the half-pipes so that water will not leak from them and will have to coordinate and cooperate to direct the pipe in a way which would let the water flow from one extreme to another. At the beginning of the line a participant will pour water from a bucket into the pipe and at the end of the line another participant will collect it in a bucket. In the end, the team who will be able to collect the largest amount of water will win the competition. Throughout the whole activity, the participants should coordinate with each other to achieve the best result possible. At the end, a small discussion will be done to elaborate on the knowledge acquired from the activity.

Outcomes

The objective of this activity is to enhance teamwork, communication, planning and creativity between women to result in the final common goal which is to transport water with minimal losses and to understand the importance of maintaining

good water infrastructure without water leakage. From this activity, women are expected to elaborate on what they learned and each member should give her own view on the importance of saving water and a suggestion on how to do it in a cooperative fashion. In this activity, women will learn how to work together to reduce water loss, this is important when conducting activities related to water use and management.

Material needed:

-half pipes (5-10) -plastic buckets -water

c. The Water Cycle Experience

This activity represents the water cycle through a hands-on learning experience. The activity highlights how water changes form and exists in three states: solid, liquid and gas. To do this activity, water is poured in a cooking pot and heated using camping gas stove. Once the water boils, it evaporates and reaches a big nylon sheet that is placed above the pot at different heights. This shows how the water evaporates and condenses on the nylon sheet and precipitates again.

Outcomes

The objective of this activity is to shed light on the water cycle highlighting evaporation, condensation and precipitation and allowing the women to understand and visualize the water cycle through a hands-on experience. Women are expected to show that they have retained the knowledge provided to them through the visualization of the water cycle and to be able to reformulate the information in their own way. This is confirmed through an open discussion about the experience too.

Material needed:

-camping gas stove
-cooking pot
-nylon sheets
-water

B. Climate Change

Climate change is an emerging issue that has recently been addressed and many adaptation and mitigation strategies have been newly proposed. Climate change impacts are known to be exacerbated by anthropogenic factors that tend to increase the rate at which environmental degradation is occurring. Thus, targeting the population and raising their awareness on climate change impacts will prove to be effective; this will take place by teaching them how to use sustainable methods and adaptation tools for combating climate change. Thus, women are a major group to target in order to increase awareness and knowledge on climate change and propose strategies to adapt to such impacts. This knowledge will also be disseminated to the younger generation through guidance from their mothers.

1. Climate Change Related Activities

a. Climate Change Proverbs

For this activity, women will be asked to name proverbs that are related to every month of the year. These proverbs are related to changes in weather conditions. A list will be made and missing proverbs will be identified by the educators. Then, they will comment on each and explain why these proverbs exist and discuss the changes that are happening as a result of climate change.

Outcomes

This activity will serve as an ice breaker and will enhance communication skills among the women and increase their capacity to understand climate change related matters. It will teach team bonding since this activity will require participation from the women. Lastly, it will increase awareness on climate change impacts and risks.

Material needed:

-flip chart -list of proverbs -colored markers

b. Climate Change Indicators

The following exercise was adopted from the vulnerability assessment tools that were applied previously throughout the SEARCH project in order to identify the vulnerability of the local communities to climate change and elaborate on climate change definition in a simple approach.

For this activity, a table of climate change indicators from several sources such as the United Nations climate change indicators is introduced to women. Then, women are asked if they have witnessed changes based on the indicators and to fill in a table. In a next phase, women will be given the chance to add any indicator that they feel is important and was not mentioned in the table (**Figure 13**).



Figure 13: Learning about climate change indicators

Outcomes

The aim of this activity is to increase understanding and raise awareness on climate change by selecting climate change indicators. It is expected to enhance communication and participation among the women and allow them to better understand their surroundings and the changes that are occurring due to climate change.

c. Carbon Calculator

In this activity the women will be asked to assess how large an amount of carbon dioxide they produce approximately.

First, it will be explained to them that carbon dioxide (CO2) is an important greenhouse gas, and that the burning of carbon-based fuels since the industrial revolution, has rapidly increased its concentration, leading to global warming. Then, each of them will be asked to approximately assess how much electricity do they use, how much gas and how much do they travel per year. Finally, the women will discuss and propose ways to reduce their energy consumption; the educators, in turn, will explain simple, everyday ways to save energy such as: always switching off lights, switching off stoves at night, trying to us buses instead of cars, etc.

Outcomes

The aim of this activity is to raise women's awareness about the relation between climate change and carbon dioxide production. Moreover, women will become able to assess their levels of consumption of energy and production of CO2, and will be provided with valuable information on how to reduce them. They will also develop communication skills and team spirit through the discussion of viable ways to reduce CO2 emissions.

C. Forests

The Upper Akkar watershed is known for its vast forest cover and beautiful landscapes. The forests of this area are diverse thus, protecting these forests is crucial not only for the benefits that forests provide the local community with, but also because they act as reservoirs for water resources. Thus, users of the forests should be aware of the risks they are posing on the forests whether they are, grazers, loggers, farmers, women, children or anyone from the local community since all benefit one way or another from the forests. Thus, targeting the women population is important to teach them how to protect the forest and live in harmony with it. This will in turn be translated to the younger generation through the teachings of their parents.

1. Forest Related Activities a. Tree Planting Activity

In this activity, women are divided into groups of 2-5 where each group is in charge of planting a tree. During the activity, a small discussion should take place where the women elaborate on why they think planting trees and preserving forests is important (**Figure 14**).



Figure 14: Women preparing for tree planting activity

Outcomes

The objective of this activity is to raise awareness on forest conservation and the importance of maintaining forests as a fundamental part of the environment. It also highlights the importance of trees crucial role in the sustainability of our environment. Throughout the activity, the women are expected to discuss the importance of protecting forests, preventing fires and planting trees as a way to ensure the survival of forests. They should also learn the link between forests, water and climate change and the value of forests as reservoirs for water resources.

Material needed:

-trees

-shovels

-water bucket



Figure 15: Local women community members

b. Wildfires Awareness and Prevention Activity

In this activity women will first be provided with information about how wildfires happen in forests. Sometimes wildfires happen naturally as the result of lightning hitting the forests, but often they are caused by humans' irresponsible behavior. An explanation about what must be present for fire to burn should also be provided. The three elements which let fire burn should be discussed: fuel (wood, coal, gas, etc.), oxygen and heat or ignition source (matches, lightning, etc.). To prevent and extinguish fires, at least one of these elements should be removed or restricted. Women should brainstorm in groups, and come up with ideas on how to extinguish wildfires accordingly.

Outcomes

Through this activity, women's awareness about wildfires and the importance of preventing and stop them will be enhanced. Moreover, this activity improves team
bonding and women will develop their communication skills and their care for forests while being provided with valuable information about wildfires, forests and humans' impact on them.

c. Drip Water Irrigation for Planting

For this activity, women will be given different sized plastic bottles depending on the size of the plantation. Next, the plastic bottles will be placed upside down and cut open from the top. Then, holes will be made at the bottom so that water can easily penetrate through but keeping in mind that the holes should be small in size as not to waste water. Next, the plastic bottles will be placed in the soil where the plantation is present and water will be poured inside the plastic bottles. This will help irrigate the plants using drip irrigation with minimal water loss.

Outcomes

This activity will teach women how to save water and use more sustainable practices at the household level. Also, it will teach women about and encourage their use of recycled products. Finally, the women will learn a way to reduce water consumption by economizing on the use of water resources.

Material needed:

-plastic bottles of different sizes
-tree pot + soil
-water bucket
-small needle to make the holes
-scissors to cut top of plastic bottles

D. Supporting power point presentations for education officers

- 1. General Presentation (including water, climate change and forests)
- 2. Presentation on water use
- 3. Certificate for the women participation

1. General Presentation (including water, climate change and forests)

SPNL IUCN Society for the Residual one Protection of مشروع تعليم وتوعية عن المياه والغابات والتغير المناخ ضمن مشروع: المقاومة الاجتماعية , الايكولوجية والزراعية SEARCH للتغير المناخي • جمعية حماية الطبيعة في لبنان SPNL MADA حمعية من هي الجمعية؟ من بين أول الجمعيات البيئية التي تأسست في لبنان. تأسست جمعية حماية الطبيعة في لبنان (SPNL) رسمياً عام 1986. جمعية وطنية تعمل في كل لبنان، غير ربحية,غير طائفية وغير سياسية. • رسالة جمعية حماية الطبيعة في لبنان- SPNL: تسعى الجمعية إلى حماية الطبيعة، الطيور والتنوع البيولوجي في لبنان؛ ونشر مبادئ الاستخدام المستدام للموارد الطبيعية بالاضافة الى دعم المجتمع المحلى وتنمية قدراته

تقليد الحمى تقليد معروف في المنطقة العربية منذ أكثر من ألفي سنة. يهدف هذا التقليد إلى حماية المناطق لفترة معينة لضمان مصدر حياتهم. يتخذ قرار الحماية بالشورى عبر المجتمع المحلى نفسه. مثلاً: يمنع الرعي في منطقة ما لفترة زمنية على أن تستعمل لاحقاً. اسلوب مستدام لادارة الموارد الطبيعية وحمايتها عن طريق اشراك المجتمعات المحلية وتفعيل دورها من اجل الحفاظ على مصادر العيش النساء و الحمي ان للنساء دور أساسى في ادارة الحمى و الموارد الطبيعية: الزراعة: + Fur Fra





النساء و الحمي • كما و للنساء دور اساسي في: - نشر الوعي البيئي جمع الحطب - استخدام الموارد المائية ۔ الأعتناء بالمواشي - احياء النشاطات الثقافية (حياكة السجاد, الشغل اليدوي, مونة, ر عي...) السياحة البيئية

المقاومة الاجتماعية , الايكولوجية والزراعية SEARCH للتغير المناخي • مشروع اقليمي يجمع بين خمسة دول من اجل خلق وتجربة منهج محلى لمقاومة اثر التغير المناخى عن طريق التعلم والتخطيط التشاركي مع المعنين في المناطق المطبق فيها • الخمس دول : لبنان, الاردن, فلسطين, مصر, المغرب يهدف المشروع الى: تقوية المقاومة الاجتماعية والاقتصادية في موائل الحوض المائي لمنطقة الشرق الاوسط للحد من اثأر التغير المناخي وتأثيرات اخرى تنمية القدرات في استخدام ادوات التأقلم مع التغير المناخي , التخطيط وبناء الاستراتجيات عن طريق تبادل المعرفة على عدة مستويات (محلي , وطني, واقليمي) • التخطيط التشاركي • اختيار مناطق نموزجية للتطبيق

 توثيق الوسائل والنماذج والطرق و عملية التعلم بالاضافة الى نقل ومشاركة المعرفة والمعلومات على مستويات عدة

2014



مقصد ممتاز لتعزيز السياحة البيئية.



- الكروم Vines -
- زيتون Olives -
- Fruit trees (apricots, apples, plums, peaches, etc.) أشجار الفاكهة



غلبة المحاصيل الموسمية غلبة المحاصيل الموسمية الهجرة من الريف عدم وجود تسويق المنتجات الزراعية عدم وجود تسويق المنتجات الزراعية الظروف مناخية (الحشرات, الظروف مناخية القاسية..) نقص موارد المياه للري بسبب سوء استخدام المياه

المشاكل الرئيسية المتعلقة الزراعة

المهمات المكتملة خلال المشروع

- لقاء المعنين (عندكت-قبيات-عيدمون \كرم شباط)
- تحديد منطقة العمل وتحديد المشاكل (تغير المناخ-نقص المياه -ادارة المياه- الرعي الجائر- غياب إدارة الغابات - حرائق الغابات)
 - لقاءات مفتوحة لجمع المعلومات (مقابلات-استمارات-دراسات علمية)
 - تقييم الهشاشة الاجتماعية والايكولوجية
 - اختيار منطقة نموذجية لتطبيق مشاريع التاقلم

Г

تقييم الحساسية (Sensitivity Analysis)				
عندقت	عيدمون-كرم شباط	قبيات	معايير سبل العيش	
			المقومات الانسانية	
مرتفع	وسط	مرتفع	مستوى التعليم	
منحفض	مرتفع	منحفض	مستوى الفقر	
وسط	منحفض	وسط	الدخل	
وسط	وسط	مرتفع	الحصول على الخدمات الصحية	
وسط	منحفض	وسط	مستوى الوعي	
			المقومات الطبيعية	
منحفض	مرتفع	منحفض	الاعتماد على الزراعة	
مرتفع	مرتفع	مرتفع	الاعتماد على الموارد المائية	
منحفض	مرتفع	منحفض	الاعتماد على الثروة الحيوانية	
مرتفع	مرتفع	وسط	الاعتماد على	

القبيات	عیدمون - کرم شباط	عندقت	
			المقومات الفيزيائية
يملك	يملك	يملك	ملكية منزل
يملك	يملك	يملك	ملكية الارض
يملك	يملك	يملك	مليكة مصادر نقل
يملك	يملك	يملك	ملكية الكترونيات
			المقومات الاجتماعية
مرتفع	مرتفع	مرتفع	المشاركة في المنزل
مرتفع	وسط	مرتفع	عضو في جمعيات محلية
			المقومات المالية
مرتفع	وسط	مرتفع	توفر معاش تقاعدي
مرتفع	وسط	مرتفع	الاعتماد على الوضيفة
مرتفع	وسط	مرتفع	التجارة

عيدمون- كرم شباط	قبيات	عندقت	المؤشير
			تغيرات الطقس
ارتفاع	ارتفاع	ارتفاع	
N.			حرارة فصل الصيف
انخفاض	انخفاض	انخفاض	درجات حرارة فصل الشتاء
انخفاض	انخفاض	انخفاض	نسبة هطول الامطار
انخفاض	انخفاض	انخفاض	عدد ايام الأمطار
ارتفاع	ارتفاع	ارتفاع	رياح الخماسين
انخفاض	انخفاض	انخفاض	
			رياح الشتاء
ارتفاغ	ارتفاع	ارتفاع	سنوات الجفاف
انخفاض	انخفاض	انخفاض	الجليد
عدم التاثر	عدم التاثر	عدم التاثر	الفيضانات

				متفرقات
ſ	القبيات	عيدمون	عندقت	المؤشر
C	ارتفاع	ارتفاع	ارتفاع	استخدام الطاقة الكهربائية
	ارتفاع	ارتفاع	ارتفاع	استخدام المياه
	ارتفاع	ارتفاع	ارتفاع	التلوث
	ارتفاع	ارتفاع	ارتفاع	الغبار والاتربة
	ارتفاع	ارتفاع	ارتفاع	الامراض المعدية والفيروسات
	ارتفاع	ارتفاع	ارتفاع	امراض الازما
	ارتفاع	ارتفاع	ارتفاع	الحشرات والقوارض





قطع الاشجار في كرم شباط





Forest fires

- unsustainable
- forest practices
- neglect of forested lands
- uncontrolled grazing practices



oak and pine forests have become highly susceptible to fire eventsصنوبر - بلوط















الخلاصة

- اهمية دور المرأة في ادارة الموارد الطبيعية
 اهمية المحافظة على المياه
 اهمية المحافظة وادارة الغابات
- اهمية المحافظة على المياه على المستوى المنزلي
- توعية حول تغير المناخ وآثاره على المياه والغابات

Women

recommendations/suggestions

- Build a water tank for the collection of rain water in the village to be used in times of water shortages (mostly summertime)
- Project: re-use of wastewater by filtering it to become clean "grey water concept". This concept was initiated in Qobayat however was never continued
- Involve children in all activities happening in the village related to environment like the workshop that happened today was very nice and beneficial for the children (great learning experience)
- Drip irrigation technique for farmers to reduce on loss of water
- Eco-tourism activities: however only for 1 day, as not to waste more water



2. Presentation on water use













غسل الصحون في حوض مملوء بدلا من تحت حنفية مفتوحة











3. Certificate for the women participation

2014



2. Children as a target group

This educational booklet targets children between the ages of 8-12 years. This age group was chosen since this is the best age for children to build their future behavior towards the environment. Indeed, children of this age are like sponges, they are already able to interact and transmit the knowledge they acquire to the society around them including their parents (**Figure 16**). Finally, working with the new generation will ensure sustainability and enhance environment conservation in the future.



Figure 16: Children's educational workshop

A. Water Resources

To educate children on water management and conservation is of vital importance because they represent the future generation. Raising their awareness on water related issues will enable them to distinguish between right and wrong habits while using water, for example, they will learn not to leave the tap open while soaping under the shower and that will prevent water loss.

Moreover; they will learn through fun and hands-on experiences about the water cycle and will also develop communication skills and their team building capacity will be enhanced focusing on strategies to save water through cooperation (**Figure 17**).



Figure 17: Children playing with water

1. Water Related Activities

a. Play on Water Related Issues

In this activity, children will be divided into teams of 7-8 children each and given ten minutes to create a short play about water related issues after the screening of a power point presentation related to the topic (find in part D). Then, each group will present his own play and the one with the strongest messages on water and conservation will win a prize.

Outcomes

The main outcome of the play is the development of team bonds, communication skills and creativity. Moreover, the children will demonstrate the capability of putting into practice the knowledge they acquire. From the play, the educators will be given the possibility to make sure that all the information had been properly processed and understood by the children and could be applied by them in everyday life.

b. The Water Cycle Experience

The water cycle activity is a hands-on experience to show to the children how the water cycle happens. During the activity, the focus should be on how water changes form and exists in three states: solid, liquid and gas. Water should be poured in a cooking pot and heated using a camping gas stove. After the water boils, it evaporates and reaches a big nylon sheet placed above the pot at different heights. The children therefore can see how the same amount of water evaporates and then condenses on the nylon sheet and precipitates again.

Outcomes

The objective of this activity is to shed light on the water cycle highlighting evaporation, condensation and precipitation and allowing children to understand and visualize the water cycle. The children are expected to manifest that they have retained the knowledge provided to them especially through the visualization of the water cycle and to be able to reformulate the information in their own way.

Materials needed:

-camping gas -cooking pot stove -nylon sheets -water

c. The Half-pipe Activity

The half-pipe activity should be done in the open air (**Figure 18**). Children are divided into two teams which compete to transport water with minimal wastage (**Figure 19**). The two teams are provided with ten half-pipes each; the children have to position the half-pipes so that water will not leak from them and have to coordinate and cooperate to direct the pipe in a way which will let the water flow from an extreme to the other. At the beginning of the line, a child will be pouring water from a bucket into the pipe and at the end of the line another child will be collecting it. In the end, the team who will collect the maximum amount of water will win the competition.



2014

Figure 18: Water Half-pipe activity with the children



Figure 19: Water Half-pipe activity Teams competition

Outcomes

The objective of this activity is to enhance teamwork, communication, planning and creativity to result in the final common focus which is to transport water with minimal loss and to understand the importance of maintaining good water infrastructure without water leakage. After the activity, children are expected to be able to discuss what they have learned and each team member should give his own view on the importance of saving water and a suggestion on how to do it in a cooperative fashion.

Materials needed:

-half pipes -buckets -water

d. Water Volleyball

Water volleyball requires an open space to be played. The children are divided in two teams and provided with big towels and balloons filled with water. The rules of the game are to throw the water filled balloons to each other and catch the balloons with the towels, being careful not to let the balloons fall nor break releasing water.

Outcomes

The objective of this activity is to raise children's awareness on water conservation through this playful activity. From this activity, children are expected to enhance teamwork and communication between each other highlighting the importance of water conservation.

Materials needed:

-balloons -towels -water

B. Climate Change

It is fundamental to increase children's knowledge and awareness on climate change for several reasons. They are facing and will probably have to face climate change in the future so they need to be provided with a set of information which will enable them to develop strategies to adapt to climate change impacts. The learning experience they will undergo will serve the purpose of modeling their future behavior and thus their influence on the environment. They will also spread the knowledge acquired, today to their parents, tomorrow to their children.

1. Climate Change Related Activities

a. Climate Change Play

In this activity, children are divided into four or five teams of 6-7 children depending on the number of children available. Each team is given ten minutes to create a short play about climate change and global warming that had previously been discussed in a power point presentation (see part D). Then, each group presents his own play and after a voting process, the one with the strongest awareness messages based on the provided background will win a prize. The plays should focus on climate change, the greenhouse effect, global warming and pollution. They should also stress on how the four seasons are changing due to these negative impacts.

Outcomes

The main outcome of the play is the development of team bonds, communication skills and creativity. Moreover, the children should demonstrate that they are capable of putting into practice the knowledge they had acquired on climate change related issues. The play will also give the educators the possibility to make sure that all the information had been properly processed and understood by the children and that they could model their future behavior accordingly.



Figure 20: Children activities

b. The Climate Change Quiz

In this activity, children are divided into teams of 7-8 children, and asked a set of questions related to climate change. To answer the questions, children must discuss and collaborate with each other to come up with the correct answers and explanations. Questions may include:

-Due to climate change, is the sea level increasing or decreasing?

-Is the amount of rainfall increasing or decreasing?

-Is temperature increasing or decreasing?

-Is the ozone layer getting thicker or thinner?

-Are animals becoming extinct because of global warming?

-Are the four seasons at risk due to climate change?

The group with the highest number of correct answers wins the challenge and each member is rewarded.

Outcomes

The aim of this activity is to enhance team building, communication skills and creativity among children. It also allows the children to be able to understand and reformulate the information that were given to them related to climate change. Also, it is expected that the children will increase their knowledge on climate change impacts on their surroundings and the importance of reducing anthropogenic pressures on the environment.

c. The Baking Soda Volcano Activity

In this activity, a small 'baking soda volcano' will be created so that children can visualize carbon dioxide production. It will be explained to the children how CO2 is produced and affects climate change because of its excessive presence in the atmosphere due to increased industrialization. For the experiment to take place you should place a small amount of baking soda (two teaspoons) into a clear, plastic drinks bottle. Then, the bottle should be placed into a bowl to collect the foam that spills out. Aside, you should mix a small amount (about ¼ of a cup) of vinegar with a few drops of washing soap. Food coloring can also be added for greater effect. Finally, add the vinegar mixture to the bottle and watch the foaming 'lava' that erupts. Children should be taught that the sodium bicarbonate is reacting with the acidic vinegar to produce carbon dioxide gas. The washing liquid soap then froths up the bubbles containing the carbon dioxide.

Outcomes

Through this hands-on experience children will be able to visualize the process of CO2 production while learning about its effects on climate change. Children's patience and capacity to focus will be enhanced, and they will improve their ability to link a small-scale phenomenon to a general one.

- Baking soda
- Bottle of water
- Bowl
- Vinegar
- Washing liquid soap
- Food coloring

C. Forests

The Upper Akkar forests are crucial for the population's survival and well-being. They are important because they are a site were a variety of flora and fauna founds a shelter, because they provide benefits to the local community and because they contain vital water reserves.

Enhancing children's awareness and knowledge about the importance of forests conservation and protection will ensure a better management of forests by the local community in the future. Moreover, children have a different and more direct relationship with nature and understanding, it is important to help them developing it in a way which will enable them to have a harmonious and sustainable behavior concerning forests.

1. Forest Related Activities

a. Tree Planting Activity

Children are divided in groups of 6-7 and each group is in charge of planting a tree. During the activity, children are asked to say in turn why they think planting trees and preserving forests is important. The whole activity is undertaken in the nature and children are asked to use all their senses in discovering nature. Finally, all stand in a circle and each gives his/her own suggestion on how to protect forests.


Figure 21: Tree planting activity

Outcomes

The objective of this activity is to raise awareness on forest conservation and on the importance of maintaining forests as a fundamental part of the environment. It also highlights the importance of trees in photosynthesis for the sustainability of our environment. The children are expected to understand the importance of protecting forests, preventing fires and planting trees as a way to ensure the survival of forests.

Materials needed:

-trees -shovels -water bucket



Figure 22: The tree planting circle

b. The Jelly Bean 'Fasoolia' Experiment

In this activity, plastic bowls, cotton and beans are distributed to the children and then they are shown an already grown bean which has to be prepared previously. To prepare it, educators need to put a layer of cotton in the plastic bowl, then position three beans over the cotton but in a way that they do not touch each other. After a second layer of cotton is placed above the beans, a small amount of water is poured over them as to make the cottons moist. Finally, the planted beans are exposed to the sunlight for a period of 3 days where the first sprout will appear. The children should be taught the whole process and the fact that the beans have to receive constant sunlight for the photosynthesis process to happen should be stressed too.

Outcomes

The objective of this activity is to teach children about the importance of planting trees for the environment and how trees should be constantly protected. Moreover, this hands-on experience is useful because it enhances children's love for nature.

At the end of this activity, the children are expected to explain the photosynthesis process in their own words and show their understanding of the steps required to grow a plant.

Materials needed:

-cotton -"fasoolia" beans -plastic bowls -water



Figure 23: Children learning about water

D. Supporting power point presentations for education officers

1. Children Power point presentation









أغسل يدي بقا من الماء 0 0 لا اترك حنفية الماء مفتوحاً





انتبه !!!! كن حذرا مع الحنفية

>>







في هذه الصورة حدد التصرفات الخاطئة















اثار تغيير المناخ





اهمية الحفاظ على الغابات -خزان للمياه توفر الأوكسجين من أجل
 العيش
 توفر الخشب التي يستعمل للتدفئة والطبخ -أنشطة الرعي





الخطرعلى الغابات

- < كسارات
- تغير المناخ
- حرائق الغابات
 - قطع الشجر
- الرعي الجائر
- عدم الحماية والتوعية
- عدم وجود إدارة الغابات







ظاهرة الاحتباس الحراري

>>



كيف سيكون المستقبل؟







3. Farmers as a target group

Farmers are chosen as a target group in this educational booklet because they practice agriculture which is the most common profession in the area. More than 60% of the community of Upper Akkar is engaged in agricultural practices which require large amounts of water for irrigation. Moreover, this is challenged by climate change which affects the water supply and crop production. Also, threats to the forests of Upper Akkar are imposing further stress on agriculture, thus it is important to increase farmers' awareness and knowledge on such issues.

It is important to target farmers because they are the main users of water given that, through the practices of irrigation, they utilize great amounts of water. Moreover, farmers are particularly affected by climate change in relation to agriculture diseases and water shortage, thus they have to learn how to adapt to climate change vulnerabilities. Thus, the more knowledge and awareness farmers have, the more they are able to solve the problems they are facing. Forests conservation is also a very sensitive issue for farmers given that forests reduce the quantity of CO₂ present in the air and thus, decrease the impact of climate change on the area. This educational booklet will allow farmers to learn through an interactive approach allowing team spirit and a sense of community belonging to emerge in each of the participants.



Figure 24: Farming activities



Figure 25: Farmers engaging in planting activities

A. Water Resources

The agriculture sector uses the largest amounts of water as compared to other sectors. Learning how to manage and prevent water losses is of great importance,

thus it is fundamental to raise awareness and provide knowledge about sustainable water practices to farmers. Since most of the techniques they use are old and degraded, this is leading to massive water losses. Furthermore, alternative methods will be highlighted so that farmers can have a better understanding which can be translated in practice.

Without water, either in terms of precipitation or irrigation, agriculture could not be considered a source of livelihood in Upper Akkar. Moreover water shortage aggravated by climate changes impacts in rural areas provoke problems in the production of food supplies for the larger community given that there is no land available for cultivation in the urban areas. Water is the main factor affecting plants physiology and biology, 85% of fruits and crops are made of water and the right usage of water could increase productivity up to the 80%. In semiarid areas, such as the ones present in the Upper Akkar region, water shortages reduces crop production which is expected to affect farmers' income. Finally, fertilizers will not be affective without ample water, where fertilizers are soluble in water only. This is an added reason why water awareness is fundamental for the farmers to develop (**Figure 25**).

1. Water Related Activities

a. Economizing on the Use of Water

In this activity, farmers will be shown, through a hands-on experience, how to irrigate the fields properly, minimizing water wastage and increasing profitability at the same time.

First of all, some soil will be put in a transparent pot and water will be poured over it so that the farmers can visualize how rapidly water infiltrates into the soil. Several types of soil should be used in order to show how different soils absorb water faster or slower. Through this simple experiment, it is possible to demonstrate how when you pour a large quantity of water in the soil in a short period of time the water will go below the root zone and therefore the plants will not benefit from it.

Finally, from this activity, farmers will have a better understanding of the importance of water conservation and of using the right quantity of water while irrigating. Also, they will gain experience on maximizing water use by increasing the time for irrigation that will not only use less water, but will improve crop production.



Figure 26: Farmers learning about water conservation

Outcomes

Through this activity, the farmers will learn how to economize on the use of water in order to satisfy crop needs without wasting water. Farmers will be provided with useful information regarding how to utilize water. Thanks to this simple experiment, farmers will have the chance to visualize the causes of water losses and will be able to apply them while irrigating.

Material needed:

-transparent pot -soil -water

b. Drip Water Irrigation for Planting

For this activity, farmers will be taught how to irrigate their agricultural fields or plantations using sustainable methods. The farmers will be given different sized plastic bottles depending on the size of the plantation. Next, the plastic bottles will be placed upside down and cut open from the top. Then, holes will be made at the bottom so that water can easily penetrate through but keeping in mind that the holes should be small in size as not to waste water. Next, the plastic bottles will be placed in the soil and water will be poured inside the plastic bottles. This will help irrigate the plants using drip irrigation with minimal water loss.

Outcomes

The aim of this activity is to teach farmers how to save water and use more sustainable practices while farming. Also, it will teach farmers and encourage the use of recycled products. It also teaches water economy by economizing on the use of water resources.

Material needed:

-plastic bottles of different sizes
-tree pot + soil
-water bucket
-small needle to make the holes
-scissors to cut top of plastic bottles

B. Climate Change

A study by the United Nations showed that the Upper Akkar region is the most sensitive to climate change. Moreover, agriculture is much influenced by the impacts of climate change which affects the amount of water available as well as the quality and quantity of crops produced. Thus, farmers should learn new strategies to adapt to climate change. In addition, studies show climate change is exacerbated by anthropogenic factors, farmers and farming practices being responsible for a large share of it (MoE/GEF/UNDP, 2011).

Climate change is causing a reduction in precipitations in the Upper Akkar region. Minimum precipitation is needed for rain-fed crops such as olive which is widespread in the area. A sufficient quantity of irrigation water is required to yield profitable fruit trees and seasonal production. Accordingly, farmers should be the first target group when addressing the effect of climate change. In parallel, farmers could contribute to the source of climate change when applying unsustainable agricultural practices. Fertilizer volatilization, agricultural machinery, CH3 from animal are all examples of what might cause an increase in the levels of CO_2 . The increase in temperature and decrease in precipitation affects irrigation, control of pests, biodiversity, agricultural practices (fertilization, weed control, etc.), quality

and quantity of production. Therefore, farmers who represent the main economic sector in rural areas are the first target group to make a difference in mitigating the effects of climate change. One of the most devastating impacts of climate change on agriculture is caused by the rise of temperature because it provokes a reduction in precipitation, it affects the quantity and quality of crops production and it provokes pests development at a faster rate. Furthermore, rises in temperature increase evapotranspiration and thus a larger amount of water is needed to counter this effect. Finally, biodiversity is affected by climate change and droughts as well as desertification are also caused by these rises in temperature.



Figure 27: Farmers learning about water conservation

1. Climate Change Related Activities

a. Proper Irrigation

This activity tackles irrigation issues related to climate change. It makes the farmers visualize the advantages of certain ways of irrigating compared to others given the scarcity of water available due to the rise in temperature. In this activity, a small field plastic model will be used to allow the farmers to visualize the difference

between sprinkler irrigation and drip irrigation which can bring the water where needed avoiding the wastage that sprinkler's irrigation causes.

The model will be put on a desk and water will be poured in it. Some places will be colored to show where water is most needed. Then, a sprinkler will be activated and the farmers will visualize how water spreads from it and gets in equal quantity where needed and where not. The same will be done with a drip and it will become clear how, through this system, it is possible to redirect water and make it arrive where wanted without wasting it.

This irrigation method saves water and fertilizer by allowing water to drip slowly to the roots of plants, either onto the soil surface or directly into the root zone, through a network of valves, pipes, tubing, and emitters. It is done through narrow tubes that deliver water directly to the base of the plant.

Outcomes

The aim of this activity is to raise farmers' awareness regarding water related issues caused by climate change. It is very important to let them visualize and discover through a direct experience the difference between irrigation methods and how they could save a great amount of water just by using more sustainable methods, therefore increasing fields' productivity.

Material Needed

- Plastic model

- Water

b. Climate Change Indicators and Discussion

For this activity, prepare a table of climate change indicators from several sources such as the United Nations climate change indicators. Then, ask the farmers if they have witnessed changes based on the indicators and to fill the table. In a next phase, they will be given the chance to add any indicator that they feel is important. After that a series of practices will be discussed, such as mulching, the convenience of irrigating fields through canals instead of flood irrigation, how proper fertilization is useful in reducing volatilization and how a selection of varieties of plants can help in better adapting to climate change.



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Figure 28: Farmer's engaging in discussions about climate change impacts

Outcomes

The aim of this activity is to increase knowledge and raise awareness on climate change by selecting climate change indicators. It is expected to enhance communication and participation among the farmers and allow them to better understand their surroundings and the changes that are occurring due to climate change. It is also useful because it provides the farmers with valuable information about practices that can help them facing the effects of climate change better.

C. Forests

Forests in Upper Akkar are characterized by their large variety and spread over the area in which they cover 21% of the surface of the region. However, these forests are challenged by a variety of factors that include logging, grazing, climate change, forest fires etc... Farmers which benefit from these forests are being affected by the threats on the forests, but at the same time they are contributing to their increased deterioration.

The Upper Akkar watershed is known for its vast forest cover and beautiful landscapes. The forests of this area are diverse thus, protecting these forests is

crucial not only for the benefits that forests provide the local community with, but also because they act as reservoirs for water resources. Moreover, forests absorb CO_2 and that reduces the effect of climate change. Thus, users of the forests should be aware of the risks they are posing on the forests whether it be grazers, loggers, farmers, women, children or anyone from the local community since all benefit one way or another from the forests. Farmers are a fundamental target because they are the part of the population which is in direct contact with forests the most.

1. Forest Related Activities

a. Planting Practices

In this activity, farmers will be informed about the importance of constantly replanting trees in order for the forests to survive climate change and for the soil to remain fertile. The activity will take place at forests borders where trees will be planted. The importance of keeping land grass in land that is not under cultivation will also be discussed.



Figure 29: Farmer's planting activity

Outcomes

The objective of this activity is to raise awareness on forest conservation and on the importance of maintaining forests as a fundamental part of the environment. It also highlights the importance of trees in photosynthesis for the sustainability of our environment. This activity should ensure the durability of the project even after its conclusion. The farmers should also learn the link between forests, water and climate change and the value of forests as reservoirs for water resources.

Material needed:

-trees -shovels -water bucket

D. Supporting power point presentations for education officers

1. Farmer's power point presentation (slides)

1. Farmer's power point presentation (slides)

تغير المناخ والزراعة الأثر وأدوات التأقلم جمعية حماية الطبيعة في لبنان ما هو تغير المناخ؟ هل لمستم تغير للمناخ في لبنان؟ خصائص لبنان المناخية





تأثير تغير المناخ على الزراعة

- الإنتاجية: نوعية وكمية المروي والبعل، الإثمار
- الأعمال الزراعية: الري، التسميد، مكافحة الآفات والأعشاب
 - البيئة: تآكل (إنجراف) التربة، التنوع البيولوجي، الجفاف،
 التصحر، الطوفان، المتساقطات (السنوية والموسمية)
 - القطاع الحيواني: الحرارة، المراعي، الأمراض، الإنتاجية (co2)

بالتزامن مع زيادة إستهلاك المياه، ا**لنمو السكاني**، التوسع الحضري

تأثير الزراعة على تغير المناخ

الأعمال الزراعية: قوة ضاغطة

- المحروقات
- إزالة الغابات الحرائق
 - الأسمدة
 - تربية الماشية
 - الحراثة
 - التلوث






الأبعاد الثلاث للزراعة المستدامة

- أن تكون سليمة بيئيا : أي لديها القدرة للمحافظة على الموارد الطبيعية وزيادة
 حيوية النظام الزراعية البيئي بأكمله ، بدءا من البشر والمحاصيل والحيوانات ،
 وحتى مكونات التربة من الأحياء العضوية الدقيقة
 - أن تكون مجدية اقتصاديا : وتعني تمكن المزار عين من إنتاج ما يكفي لتحقيق
 الاكتفاء الذاتي أو إدرار الربح أو الأمرين معا ، والحصول على عوائد كافية
 تغطي نفقات العمالة ومتطلبات الإنتاج
- أن تكون عادلة اجتماعيا : أي أن تتوزع الموارد والقدرات الإنتاجية بشكل يلبي
 الحاجات الأساسية لكافة أفراد المجتمع ، ويضمن حقوقهم في استخدام الأرض
 ورأس المال الكافي ، والمساعدة التقنية ، وفرص التسويق



تحديد الأسواق

- نوّع المداخيل والمحاصيل
- تركيز على البيع المباشر والبيع في أسواق لها قيمة مضافة
 - أهمية التعاون بين المزارعين لفتح أسواق جديدة
 - القيمة المضافة للإنتاج
 - الإشتراك في أسواق المزارعين



ترشيد إستعمال المياه

- إستعمال تقنيات التربة المستدامة لتخفيف خطر إنجراف التربة (الغطاء الخضري، الجلول....)
 - ترك منطقة عازلة بين البستان وأماكن تواجد المياه
 - حسن إدارة المياه لزيادة فعالية العناصر (الري بالتنقيط)
- كي يكون الري مستدام: يجب علينا أن لا نستعمل أكثر من الكمية المتجددة من خلال الأمطار كل سنة وإلا تصبح المياه مورد طبيعى غير متجدد.

بناء خصوبة التربة

- إعتبار التربة كائن حيّ
- تخفيف إستعمال الأسمدة المركبة والمركزة
 - التسميد بناءاً عل نتائج فحص التربة
 - تخفيف الحراثة
 - إستعمال المحصول الغطائى
 - إستعمال الكومبوست (مادة عضوية)
 - أهمية الدورة الزراعية
 - التعقيم على الطاقة الشمسية



إدارة الآفات

- توقي الآفات من خلال بناء تربة سليمة، مكان آمن للكائنات المفيدة
 - تشجيع الأعداء الطبيعية
 - تشخيص الآفات ومن ثم معالجتها
 - المعالجة بناءاً على مراحل الحياة (للأمراض والحشرات)
 - إيقاف مراحل الحشرات (التنوّع)
 - إستعمال المبيدات الأقل خطورة





IV. Conclusion

The SEARCH educational booklet will be used as a guide by educators to teach about environmental issues specifically water management, climate change and forest conservation. This booklet offers background information as well as activities that can be applied focusing on three target groups that include women, children and farmers. These target groups were chosen first because they were seen as the most sensitive and second because they are the most capable of influencing environmental change at the local level.

The overall aim of this educational booklet is to provide knowledge today in order to achieve future sustainability. It is meant to last beyond the SEARCH project duration in terms of increasing knowledge and raising awareness, thus the community can adapt to changes with minimal vulnerabilities. The significance of this booklet is that it is flexible and can be applied with no limitations to age, gender or socioeconomic status.

V. References

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http://globalsolutions.org/united-nations/climate-change http://www.epa.gov/climatestudents/impacts/effects/water.html



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