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Gender Dimensions of Science and Technology
in Agriculture and Climate Change: A Case Study
Development of Sustainable Agriculture in the Pacific (DSAP) Project

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ABSTRACT

The Secretariat of the Pacific Community (SPC) has been implementing a sustainable agricultural development project throughout the Pacific Region since 2003. The project known as the Development of Sustainable Agriculture in the Pacific (DSAP) uses participatory/consultative approach to work with local farmers and has successfully improved their food security and livelihoods while also addressing climate change-induced production problems. The DSAP project uses a gender analysis tool in its participatory methods, which has assisted in the development of gender sensitive technologies for female and male farmers. A remarkable number of women participated in the project and the project has reached really isolated areas where women are most vulnerable to cash poverty and women-headed households are becoming more predominant. The DSAP participatory approach at every point of interaction, whether at the regional, national or community level, is the key source of its success. It includes a strong gender component and was awarded the SPC Gender Award for its work across 16 Pacific Island countries in 2007.

* The views expressed in this paper are those of the author and do not necessarily represent those of the United Nations.

INTRODUCTION

The focus of this paper is on the gender dimensions of science and technology in agriculture and climate change. The subject matter is so broad that the author approaches the theme of discussion in presenting experiences gained from participating in the coordination and implementation of a European Union-funded sustainable agricultural project in the Pacific. Lessons learned from the project are shared in this paper as a case study.

BACKGROUND

1. AGRICULTURE PROJECT

The Development of Sustainable Agriculture in the Pacific (DSAP) project began in 2003, implemented by the Secretariat of the Pacific Community (SPC) Land Resources Division (LRD) in 10 Pacific Island countries and territories (PICs). These included Fiji, French Polynesia, Kiribati, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu, Wallis and Futuna. In 2005 the DSAP project was implemented in 6 additional PICs, namely Cook Islands, Federated States of Micronesia (FSM), Marshall Islands, Nauru, Niue and Palau.

The project uses a participatory approach to work with local farmers throughout the Pacific Region to improve their food security and livelihoods. The project was designed on a model that encourages country-level planning, implementation and coordination (United Nations, 2008). This was achieved by the establishment of national steering committees involving relevant stakeholders from government departments, non-government organizations, community-based organizations, development partners, farmers, etc.

The project has capitalized on existing institutional networks and complemented on-going agricultural development activities. Working in collaboration and engaging in partnerships with other units and organizations avoided a lot of duplication of activities and filled in the gaps that needed to be addressed. The project emphasized the involvement and inclusion of women and young people in its activities.

Appropriate technologies were identified, developed, implemented and promoted on farms. On-farm demonstrations were used to upgrade farmers' technical skills and increase their knowledge of sustainable agricultural production methods.

The primary beneficiaries are men and women farmers in 16 Pacific Island Countries and multiple communities. Since 2003, thousands of people are likely to have benefited. The project's extension agents work with communities to build local ownership of projects, which made the development effort a sustainable one.

2. CLIMATE CHANGE

The Pacific Islands are the most vulnerable to climate change due to its geographical remoteness and size (Intergovernmental Panel on Climate Change (IPCC), 2007). Scientists have projected that by 2100 Pacific Islands would experience:

- sea-level rise by about 0.39 metres
- surface air-temperature to increase by 2.3⁰C
- rainfall could either rise or fall with predicted impacts of -8.36% to 20.2%
- El Nino conditions possibly occurring more frequently
- tropical cyclones becoming more intense
- saline intrusion into freshwater lenses
- increased flooding

We are still 90 years away from experiencing the above, yet we are already seeing the impacts of climate change on agriculture in loss of soil productivity, decline in agricultural yield, occurrence of new pests and diseases, desertification or disturbance of dry lands, saltwater intrusion caused by sea-level rise and affects on the traditional seasonal calendars that most farmers in the Pacific rely on (Secretariat of the Pacific Community and German Agency for Technical Co-operation (SPC-GTZ), 2010).

For example, a study carried out by Henry et al (2008) on Moch, a coral island of Satawan Atoll in the Mortlock group of islands, Chuuk State, FSM, stated that its coastline was changing rapidly. Most people described it as erosion of beaches and land, the submergence of coastal vegetation, and the destruction of seawalls. Increase in height and prevalence of ‘high tide’ was identified, with the high tide season between January to March now extended through to June. Staple food crops, e.g. swamp/giant taros (*Cyrtosperma* sp.), were affected by saltwater inundation and were no longer productive. Other crops, such as breadfruit trees, pandanus, bananas, and pawpaw were affected and destroyed by salt spray from tidal surges and typhoons.

While the DSAP programme is focused on sustainable agricultural production, it also addressed these climate change-induced production problems. Thus, related benefits have been improvements to the quality of soil, more use of drought resistant or salt water resistant crops, improved irrigation systems, better management of pests and diseases, evaluation of tissue plant cultures, terraced and planted hillsides to prevent landslides and runoff, and support for widespread home gardens for better access to nutritious food. This has improved the local farmers’ resilience to disasters and climate change (United Nations, 2008).

3. SIMPLE TECHNOLOGIES FOR PACIFIC ISLAND FARMERS

In the atolls, DSAP focused on identifying problems and testing technologies with farmers to improve their traditional agricultural systems. Traditionally, the farmers used tree crop-based multi-story agricultural systems. DSAP worked to integrate livestock into these systems. In the North Pacific Island countries, DSAP worked to integrate vegetable cropping into the traditional agro-forestry agricultural systems.

In the lowlands, the emphasis moved from research to identification and promotion of promising technologies such as improved crop varieties, pest and disease management, land conservation and agro-forestry technologies.

Some of these simple technologies developed in participation with local farmers include soil improvement technologies, improved irrigation technologies, climate tolerant tissue plant cultures, home seed production technology, homemade organic pesticides, etc.

Soil improvement technologies included crop rotation, using of a cover of leguminous crops during fallow period, using of charcoal as a compost material, pot trial on compost, charcoal and nitrogen, phosphorus, and potassium (NPK), a field trial using sweet corn as the indicator crop, compost making using organic materials, women trained in making compost, use of compost, zinc (Zn), iron (Fe) and irrigation on cabbages, etc (SPC, 2009). A trade mission between Papua New Guinea (PNG) taro farmers and Fiji included a female taro farmer as part of the PNG delegation.

Improved irrigation technologies involved the simple bucket irrigation system. This was upscaled from two four gallon buckets to a bigger tank in cabbage production in Tonga. In Wallis and Futuna the two-bucket unit was upscaled to a larger drum and tank to irrigate watermelon crops.

Tissue cultured plantlets of climate tolerant crop varieties were distributed to countries. These included varieties of taro (*Colocasia esculenta*), cassava (*Manihot esculenta*), sweet potatoes (*Ipomea batatas*), and yams (*Dioscorea* spp.)

Other recommended technologies included home seed production methods, selection and collection of breadfruit varieties, making organic pesticides, establishing small scale hydroponics and poultry production systems, and land conservation methods e.g. planting pineapples along the contours instead of vetiver grass.

On-farm demonstration plots were also used to train farmers. Using a minimum tillage cultivation method, taro was planted utilizing recommended husbandry practices. The crop was harvested and data collected on size and weight of tubers as means of discussion points. Taveuni farmers from Fiji supply taro to exporters who market the produce to New Zealand, Australia, Canada, etc.

DSAP also produces and uses communication outreach tools to better promote project efforts within member countries, for example, nationally-based production and use of radio, posters, handbooks, brochures and videos.

4. ENGENDERED AGRICULTURE PROJECT

The DSAP project uses a gender analysis tool in its Participatory Rural Appraisal (PRA) approach model. In the design phase, the project worked with women, men and youth, and considered other social factors of the community such as age, cultural norms and values, etc. It conducted gender sensitization trainings for staff and stakeholders to incorporate identified gender issues in the implementation of the project activities. The project had gender focal points and a gender specialist in its regional staff. It has built the capacity of both men and women. It has increased technological training and participation of women (United Nations, 2008).

A review of the project took place in 2006 to assess its gender sensitivity. Gender mainstreaming was taken as the goal and a set of gender enabling factors listed: political will and leadership, appropriate policy framework that provides a strong rationale to take up a gender mainstreaming approach, structure of and mechanisms within an organization, human and financial resources, sex-disaggregated data, supporting tools and skills to use them, adequate motivation and demand from civil society and other stakeholders (SPC, 2007). In addition it was decided that gender sensitivity required addressing a) basic and strategic needs and, b) policy as well programme level action plan. The revised Pacific Platform for Action's focus on policy level action supported this stance.

- The review found that the DSAP project had developed a solid foundation of gender enabling factors in all the 16 project countries. This is largely due to the goodwill and leadership provided by the DSAP Project Manager and the Director of Land Resources Division which has spread through to project staff and partners.
- Gender-responsive project level actions included gender trainings for staff, staffing, representation by gender in all DSAP publications, and a strategic selection of project partners. Clearly, DSAP project partners are playing a major role in spreading activities to really isolated rural areas: the areas most vulnerable to cash poverty and, where women and women-headed households are becoming more predominant. The DSAP project is challenging traditional assumptions about male and female roles in agricultural production.
- In terms of project outcomes, first, there is compelling evidence that the project has engendered an atmosphere of buoyancy, hope and direction in rural communities, for females and males. Many comments emphasized that the DSAP project was the first time women had had a project and that this had proved to be highly motivating (SPC, 2007).
- Second, the number of women participating in the DSAP project is remarkable, including their representation on the National Steering Committees (one to two women representatives in most project countries, through to 80% in Nauru) and participation in other project activities. The Micronesian countries are disaggregating data by sex and by level of participation.
- Third, the technologies promoted by DSAP are the technologies women and men have requested and are familiar with, and in many cases these technologies are considered to be 'traditional' and integral to national identity. All told, these technologies 'fit' the family food needs and resources and also have income-generation potential.
- Fourth, the DSAP teams have succeeded in establishing the sense of mutual trust and confidence which is vital to a project.

The review also identified a few gaps that needed to be addressed, which are listed below with recommended actions:

- No specific mention of gender or women in the project document. Community and farmer were the main terms used in the project document. (*Document to be revisited to include gender mainstreaming and the words gender and women to be used where necessary*)
- No partnerships developed with the national mechanisms for gender equality and the empowerment of women (*DSAP to build partnership with the national mechanisms for gender equality and the empowerment of women, National Plan of Action and the Pacific Platform for Action*)
- Less attention has been given to address women's strategic needs, i.e. assisting women in developing the knowledge and skills to change or transform their present situation. (*DSAP to increase its assistance to address women's strategic needs*)
- Less assistance is given to farmers/participants to monitor and evaluate their own project activities. (*DSAP to encourage farmers to monitor their own progress which would be a powerful learning experience for all involved. A monitoring and evaluation sheet distinguishing between basic and strategic needs is suggested.*)

Overall, the DSAP project demonstrated strengths in capitalizing on the gender/social roles of community members as seen in Palau and FSM. Education institutions were identified as entry points of interventions to sensitize students on agriculture and food security issues, as demonstrated in the Namdrik Atoll Island of the Marshall Islands. These students later convinced their parents to grow and eat more local food crops. Nauru female and male farmers had equal access to tissue culture technology as they learned the process of hardening plantlets before being transferred to the fields. The sole female pig farmer of Palau had access to technical advice on biogas technology. The project tried to avoid recommending technologies that would end up rusted on atoll islands, as happened in the Namdrik Atoll of the Marshall Islands, where farm implements were abandoned due to poor maintenance (SPC, 2007).

The review concluded that the DSAP project is engendered due to the commitment of a gender sensitized team of agricultural researchers and extension agents.

OVERVIEW OF ISSUES

1. LESSONS LEARNED

The key source of success is DSAP's **participatory/consultative** approach, at every point of interaction, whether at the regional, national or community level. The project uses this approach throughout its life cycle.

Participatory methods (SPC, 2009a) are used to identify agricultural production problems and solutions from the perspectives of women, men and youth throughout the communities of PICs. Men, women and youth perceived and identified these needs according to their gender/social roles in their own communities. PRA survey tools are valuable tools for raising awareness and promoting discussion of gender roles and related issues.

DSAP technologies are developed with the **participation** of women and men farmers, which increased the adoption rate of recommended technologies. The multiple roles of women and men are usually considered and capitalized upon in order to lessen their burdens.

DSAP works in **partnership** with the education sector and has established food gardens cultivated by students at schools. Vegetables harvested from such food gardens are prepared for students' hot lunches. One of the impacts of this effort was the development of agriculture curricula which are taught in schools. A curriculum for vocational training targeting high school dropouts is currently being developed.

DSAP works in **collaboration** with partners to create awareness and generate interests in young women and men to pursue an academic course in agriculture. DSAP has worked with relevant Government ministries to convince the Scholarship Board to allocate a couple of scholarships for eligible students (females, males) to pursue an undergraduate degree in agriculture.

DSAP's **capacity building** programme targeted its extension agents to undertake undergraduate and post-graduate degrees during the project life. A total of eight extension agents (four males, four females) graduated with bachelors and masters degrees by the end of 2009.

DSAP works in **partnership** with the health sector and has assisted in the promotion of growing and eating nutritious food. For example, in Marshall Islands, DSAP works with the Diabetic Wellness Centre training patients on how to grow vegetables for balanced diet meals. This **collaborative** effort attempts to lower the incidence of noncommunicable diseases.

DSAP facilitates **capacity building** workshops on technical areas from planting to post harvest handling. Food technology trainings include food safety, preparation, processing and preservation. Women and men farmers are encouraged to better utilize farm produce and avoid wastage of food.

One of the **impacts** of these trainings is the intention to negotiate and formalize with Continental Airlines, which serves the Micronesian countries, to buy and serve breadfruit and banana chips made by women instead of serving passengers small Pretzel packets.

DSAP works in **collaboration** with the youth sector and encourages high school dropouts to engage in agricultural production. This effort has been successful in faith-based organizations whose young members (males, females) are effectively engaged in establishing small scale agricultural production e.g. hydroponics unit to grow vegetables and poultry.

In terms of **communication**, DSAP establishes farmers' resource/information centres where farmers can have access to information on agricultural production.

National DSAP publications are translated into **vernacular languages** to increase farmers' understanding of recommended technologies. DSAP has produced regional and national DVDs that are shown by local TV stations. DSAP also uses the radio and local newspapers to increase awareness on agricultural development issues.

2. CHALLENGES

Participatory processes take time and commitment to work well with targeted communities.

Adhering to cultural norms and values of concerned community is crucial for acceptance and enhances work.

Building trust requires engagement over long periods.

Move on with the successful efforts and learn from the unsuccessful ones.

3. IMPACTS

Examples of the impacts made by DSAP technologies are listed in Table 1 (SPC, 2009b).

Table 1: Impacts of the DSAP technologies on the communities

Technologies	Objectives	Countries	Impacts (Anecdotal and/or Quantitative)
Bucket irrigation system	1. To address problems of low water availability to crops 2. To decrease the pH of water used on coral islets and atolls for irrigation purposes to facilitate improve absorption of nutrients by crops	Niue, Nauru, Cook Islands and Marshall Islands	1. Increase in yield of vegetables and incomes of farmers in Niue 2. In Nauru apart from increasing the yield of vegetables and root crops, it has generated a national interest 3. In Marshall Islands it has raised interest so that people are also using empty water bottles for drip irrigation
Use of cover crops like <i>Mucuna</i>	To improve soil fertility and investigate its effects on bitter cassava	Niue and Cook Islands	1. In Niue and Cook Islands it is showing great potential as a cover crop 2. It has been promoted amongst farmers in Niue with good responses 3. It has been adopted by both the Cook Islands and Niue organic movements as an organic soil amendment
Use of composts on atoll soils	Improve the fertility of coral-based soils to allow for the cultivation of vegetables, fruit trees (banana, uru...) or flowers (tiare...)	FSM, Niue, Marshall Islands , Cook Islands, Palau and Nauru	1. Increase the consumption of fruits and vegetables or economic gains by the sale of products 2. Improve soil fertility and increase yield of vegetables and incomes of farmers 3. In Nauru it has shown that sweet potato can be successfully grown on atolls and produce very high yields
Reintroduction of wild varieties for food	Food security	Marshall Islands and Nauru	1. Wild sources of vegetable like wild amaranthus and noni 2. Potential to broaden households' sources of food
School vegetable gardens	Promote vegetable growing	Niue, Cook Islands, Nauru, Marshall Islands and FSM	1. Schools continue to run the program with or without DSAP 2. Vegetables included in lunches
Use of plant-derived pesticides – neem and derris extracts	To reduce use of commercial pesticides	Niue, FSM, Cook Islands and Marshall Islands	1. Controlled the insect pests, even a cluster caterpillar outbreak in taro 2. Helped in the promotion of organic farming 3. Introduced to Marshall Islands this year for insect control

The livelihood of farm households (female-headed, male-headed) was greatly improved and more.¹

4. RECOMMENDATIONS

Development of technology should be user/client-oriented (gender sensitive), which would enhance its efficiency, effectiveness, adoption rate and sustainability.

Development of technology should include participatory methods with gender analysis in its process.

Curricula for the education system at all levels should include modules on agriculture.

Education curricula in agricultural institutes should include modules on gender and participatory methods.

Recommended technology should be cost-effective and/or affordable to the users, whether male or female.

Development of technology should consider the multiple roles of women (productive, reproductive, communal and welfare), which would lessen their burden.

Extra effort should be made to extend development efforts to isolated rural areas to increase poor women's access to recommended technologies.

Usage of the local language should be encouraged to facilitate better understanding of technology by the users (female/male) and gathering of relevant information.

Usage of participatory methods should be encouraged in the development of technologies as users can easily participate using a variety of tools e.g. visualization and diagramming.

Agricultural research should capitalize on the gender roles of men and women in the given socio-cultural context to improve the gender sensitivity of any resulting recommendations and/or technologies.

Technologies developed should address both the basic and strategic needs of women as these are complementary, and doing so ensures sustainability.

Women are known to be owners of traditional knowledge which should be utilized in the process of developing technology where necessary.

Women should be encouraged to seek careers in the agricultural formal sector, usually a male-dominated sector.

¹ Documented in: Case studies, Lessons from the field, the DSAP experience, A participatory toolkit for sustainable agriculture programmes in the Pacific – the DSAP experience. Available at http://www.spc.int/lrd/index.php?option=com_docman&Itemid=138

Awareness raising programmes on encouraging male and female students to seek studies and careers in agriculture should be implemented at all levels of education and via the media.

Collection of sex-disaggregated data is a must in collecting baseline data, especially in the conduct of agricultural census surveys.

REFERENCES

Henry, R., Jeffery, W., and Pam, C. (2008), Heritage and Climate Change in Micronesia, A Report on a Pilot Study Conducted on Moch Island, Mortlock Islands, Chuuk, Federated States of Micronesia, Department of Anthropology, Archeology and Sociology, School of Arts and Social Sciences, James Cook University, January

Intergovernmental Panel on Climate Change (IPCC) (2007), Contribution of Working Group II on Impacts, Adaptation and Vulnerability to the Fourth Assessment Report, Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA

Secretariat of the Pacific Community (SPC) (2007), Gender Review: Development of Sustainable Agriculture in the Pacific (DSAP) Project, 10th Triennial Conference of Pacific Women, Secretariat of the Pacific Community, Noumea, New Caledonia, 27-31 May 2007

SPC (2007), Annual Report, DSAP Micronesia, Land Resources Division, Secretariat of the Pacific Community, December

SPC (2009), Case Studies, Lessons from the Field, the DSAP Experience, Developed by members of the DSAP team, Secretariat of the Pacific Community

SPC (2009a), A Participatory Toolkit for Sustainable Agriculture Programmes in the Pacific – the DSAP experience, developed by members of the DSAP, Secretariat of the Pacific Community

SPC (2009b), Annual Report, DSAP, Land Resources Division, Secretariat of the Pacific Community, 01 January – 31 December

SPC and German Agency for Technical Co-operation (SPC-GTZ) (2010), Agriculture and Climate Change in the Pacific Island Region, SPC/GTZ Programme on Adaptation to Climate Change in the Pacific Island Region, Land Resources Division, Secretariat of the Pacific Community

United Nations (2008), The Pacific – Women planning sustainable agriculture, Gender Perspectives: Integrating Disaster Risk Reduction into Climate Change Adaptation, Good Practices and Lessons Learned, International Strategy for Disaster Reduction, pp 22-25