Five-Year Project Implementation Plan for 2009–2014

Name of project:
Sawah, Market Access and Rice Technologies for Inland Valleys (SMART-IV)

Project Period:
October 2009–September 2014 (five years)

Project Budget (Expected):
Approximately three hundred million (300,000,000) Japanese Yen in annual installation of sixty million (60,000,000) Japanese Yen.

Backgrounds and Necessity of the Project:
The current global rice crisis demands immediate action to reduce Africa's reliance on Asian produced imports. Inland Valley Consortium (IVC)[1] of Africa Rice Center (AfricaRice; formerly WARDA) has recognized a promising and largely unexploited land resource of 200 million ha of inland valleys (also referred to as *bas-fonds*, wetlands, *dambos*, swamps, *fadamas*, *vleis,* etc.) in Sub-Saharan Africa. In particular, inland valley bottoms have considerable potential for sustainable land use intensification and/or expansion, especially of rice based cropping systems[2]. IVC has targeted on the development of a decision support system for policy-makers to sustainably utilize inland valleys and on multidisciplinary research approaches to verify the success and failure of different inland-valley development schemes[3].

The pre-condition for enhanced rice productivity in inland valley bottoms is improved water control. The Asian Sawah system [4] offers a low cost opportunity for rice intensification due to improved water control and soil fertility management. Because of limitations related to hydrology, topography and soil fertility, only about 10% of the 200 million ha of inland valleys are potentially suitable for sustainable Sawah system development (SSD)[5] in sub-Saharan Africa. Annual potential production of 20 million ha of Sawah systems is at least 40 million tons of milled rice, i.e. 8 times the present annual imports of milled rice in SSA. The diversity and complexity of African inland valleys differs from that of Asian lowlands [6] ; Sawah system development and management technologies need to be adapted to African local settings and require access to small-scale land preparation equipment, such as hydropower tillers.

The Sawah system was tested and improved between 1997 and 2007 in the Ashanti region in Ghana and the Bida region in Nigeria. From this experience valuable insights were obtained with respect to options related to soil fertility management, water control and rice technologies and the importance of land tenure and gender[7]. To upscale this experience beyond the key sites and to other countries in SSA, there is a need to conduct a multidisciplinary action research to examine suitability and adaptability of the Sawah system and at the same time to train extension workers and rice farmers using a participatory learning and action-research (PLAR) approach[8] so as to facilitate farmer-led SSD in inland valleys in SSA countries apart from Nigeria and Ghana.

Goals and Objectives:

The project goal is to improve the livelihood of the rural poor by reducing imports of rice through augmenting the production of the inland valleys in SSA. Therefore, the project aims to explore the potential of the Sawah system for increasing rice productivity in inland valleys of IVC member countries, while improving farmer access to markets and rice technologies. The objective of the project meets IVC Output Target 1: productivity of inland valley agro-ecosystems increased in the earliest version of WARDA's Medium-Term Plan[9]

Targeted Countries (1st Phase):
Starting from Benin and Togo and then expanding to other IVC countries such as Sierra Leone, Liberia and Burkina Faso

Intended Beneficiaries:
The main target group is comprised of hundreds of resource-poor small-holder farmers and their organizations in Benin and Togo.

Project Executing Agent:
AfricaRice-IVC: project management

Project Implementing Agents:

IA1: AfricaRice: convening center of IVC, participatory learning and action-research approach (PLAR) training for integrated rice management with the supply of promising rice varieties, Exploration of optimal agronomic measures and water management system in the African Sawah system, biophysical characterization of inland valleys, suitability mapping for Sawah system development (SSD)

IA2: International Water Management Institute (IWMI): expertise on socio-economic aspects of rice production, market access, adoption and impact assessment[10]

IA3: National agricultural research and extension systems (NARES) of the IVC member countries: facilitating implementation and subsequent out-scaling of SSD

Partner Institutions:

PI1: Soil Research Institute (SRI) and Crops Research Institute (CRI) of Ghana: expertise in Sawah development: training of NARES of Benin and Togo

PI2: The Hirose Project[11] of International Institute of Troipcal Agriculture (IITA-HP): expertise in Sawah development: training of NARES of Benin and Togo

PI3: Rural Development Planning Division of Japan International Research Center for Agricultural Sciences (JIRCAS-RDPD) and Regional Office in Ghana of Japan International Cooperation Agency (JICA-Ghana): sharing information and cooperation of PLAR-training for rice farmers

PI4: School of Agriculture, Kinki University (SAKU), Japan: backstop for the Sawah concept establishment and rice technology development

Working Packages[12]:

WP1: Organizing workshops for launching meeting, PLAR training for rice farmers

WP2: Establishing satellite villages for SSD according to agro-ecological zones[13] in Benin and Togo, respectively

WP3: Developing simple decision-support rules[14] and training materials for Sawah system development (SSD) based on lessons learned at the two original SSD sites in Ghana and Nigeria
WP4: Provide trainings for farmers using a participatory learning and action-research (PLAR) approach in rice technologies
WP5: SSD suitability mapping [15] of inland valleys at country level using existing data and additional surveys on bio-physical, socio-economic, technical and eco-environmental factors
WP6: Identifying site-specific constraints and their management options against SSD implementation, rice farming, water and nutrient dynamics at selected sites

Outputs:
OP1: Workshops for annual meetings and PLAR-trainings for rice farmers
OP2: Sustainable development of each 2–3 ha of Sawah demonstration site in 20–30 satellite villages with a minimum rice yield of 4 t ha^{-1}
OP3: Total land area of 200–300 ha will be managed for SSD
OP4: Total number of farmers of 150–200 farmers will be trained for SSD
OP5: Technical manual(s) and video product(s) on SSD in inland valleys[16]
OP6: Farmer-training by a PLAR approach for at least 150 agricultural leaders and representatives from various villages having in-use or potential inland valleys for rice production
OP7: SSD-suitability mapping at minimum in 30 selected inland valleys in the IVC member countries
OP8: Management options for SSD, rice farming, and water and nutrient dynamics in response to site-specific constraints

Expected Outcomes:
EO1: Meetings or workshops will improve knowledge on rice production technology and Sawah development and management in inland valleys
EO2: Decision making support system for SSD will contribute to effective and sustainable reclamation of inland valleys for rice production
EO3: Local small-holder rice farmers trained by the project can get knowledge and technical skill on SSD and they and their family enjoy improved rice productivity and economic benefits
EO4: Technical manual(s) and video product(s) on SSD can enhance dissemination effect of SSD in Sub-Saharan Africa
EO5: Suitability mapping will allow policy makers and stakeholder to select potential inland valley sites for SSD
EO5: Economic benefits and social and cultural impacts derive from SSD will be explored while monitoring local socioeconomic and environmental constraints

Project Evaluation:

PE1: Self-evaluation of the project will be conducted at 3rd (2011–2012) year for the mid-term evaluation
PE2: Self-evaluation of the project will be conducted at 5th (2013–2014) year for the final evaluation

Evaluation Criteria:

EC1: Ownership and sustainability of rice farming practices under Sawah system
EC2: Number of benchmark sites with minimum land area under Sawah system of 2 ha and with minimum rice yield of 4 t ha^{-1}.
EC3: Total land area newly developed and maintained for Sawah system[17]
EC4: Net improvement of rice yield under the Sawah system
EC5: Monitoring and assessment of net improvement of rice farmer's market access and economy (i.e. gross income, resource cost, labor cost, processing cost, transport cost, benefit, etc.)
EC6: Monitoring and assessment of influence of Sawah development on local environments, e.g. ecosystem diversity; water quality; soil fertility
EC7: Number of direct and indirect beneficiaries
EC8: Number of farmers who participate in PLAR-trainings
EC9: Technical materials such as technical manuals and suitability maps
EC10: Research output materials such as original papers, books, and conference or workshop proceedings

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[1] Inland Valley Consortium (IVC) was initiated in 1993 and is currently convened by AfricaRice to promote sustainable development of inland valleys in Sub-Saharan Africa. Its membership includes now 10 West African countries (Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ghana, Guinea, Mali, Nigeria, Sierra Leone and Togo) and 8 international institutions (WECARD/CORAF, CIRAD, FAO, IITA, ILRI, IWMI, AfricaRice and WUR).

[2] See for more details Windmeijer and Andriesse (1993) Inland Valleys in West Africa: An Agro-Ecological Characterization of Rice-Growing Environments. ILRI Publ. No. 52, ILRI, Wageningen.

[3] WARDA (2004) Strategic Plan 2003–2012. WARDA, Bouaké, Côte d'Ivoire

[4] The term Sawah refers to a leveled, bunded and puddled rice field with water inlet and outlet for irrigation and drainage [Hirose and Wakatsuki (2002) Restoration of Inland Valley Ecosystems in West Africa. Norin Tokei Kyokai]. It is normally submerged in a certain period of time during rice cultivation.

[5] Sawah system development indicates the land reclamation and introduction of Sawah components such as leveling, bunding, and puddling to farmer's fields in inland valley bottoms by using a powertiller. See Hirose and Wakatsuki (2002) for more details.

[6] See Hirose and Wakatsuki (2002) for the details

[7] See Hirose and Wakatsuki (2002) for the details

[8] Participatory learning and action-research (PLAR) is a farmer education approach based on adult learning in group farmers making use of the experiences of the group members. It is effective to facilitate farmer-to-farmer dissemination of new technology. See for more details Wopereis et al. (2009) Participatory Learning and Action Research (PLAR) for Integrated Rice Management (IRM) in Inland Valleys of Sub-Saharan Africa: Technical Manual. WARDA, Cotonou, Benin

[9] WARDA (2008) Medium-Term Plan 2009–2011. WARDA, Cotonou, Benin

[10] IWMI will be entrusted with impact assessment of SSD

[11] Hirose Project was initiated in 1992 by late Dr. Shohei Hirose (professor emeritus of Nihon University) with the financial assistance of Ministry of Education, Culture, Sports, Science and Technology, The Government of Japan. Hirose Project is officially collaborated with IITA. Dr. Hirose organized a multidisciplinary study team to characterize inland valley ecosystems and to conduct action research on Sawah development in Nigeria. The major findings of Hirose Project were documented by Hirose and Wakatsuki (2002). Hirose Project has a lot of experience in action research on Sawah system development in Nigeria.

[12] See Appendix 2 for implementation schedule

[13] Agro-ecological zones are determined by the length of vegetation growth period and rainfall. The West Africa sub-region has four major agro-ecological zones, i.e., equatorial forest zone; Guinea savanna zone; Sudan savanna zone; Sahel savanna zone, The agro ecological zonation presents a useful preliminary evaluation of natural resource potential for agriculture. See more details Windmeijer and Andriesse (1993) and Hirose and Wakatsuki (2002).

[14] A decision-making support system for Sawah system development in inland valleys targets potential users of stakeholders and policy makers.

[15] Remote sensing and GIS mapping will be developed to examine suitability of each inland valley for Sawah system development. See for example Gumma et al. (2009) Spatial model for selecting the most suitable areas of rice cultivation in the inland valley wetlands of Ghana using remote sensing and global information systems. J. Appl. Remote Sens. 3: 033537

[16] The technical manual and video will focus on Sawah development process using a powertiller. Therefore they can be distinguished from the previous technical manual such as Woperies et al. (2009) which mainly targets general rice cultivation technique in inland valleys.

[17] SSD action will be disseminated to other villages surrounding the satellite village. Although the target SSD area is 2 ha per satellite village only, we also aim to expand SSD to surrounded villages by farmer-to-farmer training. Total target area for SSD with minimam rice yield of 3–4 t/ha is 5–10 ha in each project site which should include additional SSD area around the satellite village. The SSD area and rice yield will vary depending to the size of inland valleys, local biophysical conditions, farmer's commitment and field management.

Annual Project Implementation Plan for 2009–2010

Name of Project:
Sawah, Market Access and Rice Technologies for Inland Valleys (SMART-IV)

Project Period:
October 2009–September 2010

Project Budget:
Sixty four million and thirty five thousand (64,035,000) Japanese Yen equivalent to six hundred twenty one thousand and six hundred ninety nine (621,699) US dollars (1US$ = 103 yen)

Objective:
To explore the potential of the Sawah[1] system for increasing rice productivity in inland valleys of Benin and Togo, while improving farmer access to markets and rice technologies.

Targeted Countries (1st Phase):
Benin and Togo

Intended Veneficieries:
The main target group is comprised of hundreds of resource-poor small-holder farmers and their organizations in Benin and Togo.

Project Executing Agent:
Inland Valley Consortium (IVC)[2] of Africa Rice Center (AfricaRice; formerly WARDA): project management

Project Implementing Agents:
IA1: AfricaRice: convening center of IVC, participatory learning and action-research approach (PLAR)[3] training for integrated rice management with the supply of promising rice varieties, Exploration of optimal agronomic measures and water management system in the African Sawah system, biophysical characterization of inland valleys, suitability mapping for Sawah system development (SSD)[4]
IA2: International Water Management Institute (IWMI): expertise on socio-economic aspects of rice production, market access, adoption and impact assessment[5]
IA3: National agricultural research and extension systems (NARES) of Benin and Togo: facilitating implementation and subsequent out-scaling of SSD

Partner Institutes:
PI1: Soil Research Institute (SRI) and Crops Research Institute (CRI) of Ghana: expertise in Sawah development: training of NARES of Benin and Togo
PI2: The Hirose Project[6] of International Institute of Troipcal Agriculture (IITA-HP): expertise in Sawah development: training of NARES of Benin and Togo
PI3: Rural Development Planning Division of Japan International Research Center for Agricultural Sciences (JIRCAS-RDPD) and Regional Office in

Ghana of Japan International Cooperation Agency (JICA-Ghana); sharing information and cooperation of PLAR-training for rice farmers

PI4: School of Agriculture, Kinki University (SAKU), Japan: backstop for the Sawah concept establishment and rice technology development

Working Packages[7]:

WP1: Organizing workshops for launching meeting and PLAR-training for rice-farmers

WP2: Establishing satellite villages for SSD according to agroecological zones[8] in Benin and Togo, respectively

WP3: Developing simple decision-support rules and training materials for SSD based on lessons learned at the two original SSD sites in Ghana and Nigeria

WP4: SSD suitability mapping[9] of inland valleys at country level using existing data and additional surveys on bio-physical, socio-economic, technical and eco-environmental factors

WP5: Identifying site-specific constraints and their management options against SSD implementation, rice farming, water and nutrient dynamics at selected sites

Outputs:

OP1: Workshops for launching meeting and farmer training

OP2: Sustainable development of each 1–2 ha of Sawah demonstration site in 6 benchmark villages with a minimum rice yield of 4 t ha^{-1}.

OP3: Total 3–5 ha of SSD in rice villages around each satellite village in addition to the demo farms

OP4: Total number of 30 farmers will be trained for SSD

OP5: Technical manual(s) on SSD in inland valleys

OP6: SSD-suitability mapping at minimum in 6 selected inland valleys in Benin and Togo

OP7: Management options for SSD, rice cultivation, and water and nutrient dynamics in response to site-specific constraints

Acronyms and Abbreviations

AfricaRice: Africa Rice Center
CRI; Ghana Crop Research Institute
IITA-HP: Hirose Project of International Institute of Tropical Agriculture
IVC: Inland Valley Consortium
IWMI: International Water Management Institute
JICA-Ghana: Japan International Cooperation Agency Regional Office in Ghana
JIRCAS-RDPD: Rural Development Planning Division of Japan International Research Center for Agricultural Sciences
NARES: National Agricultural Research and Extension Services
NCRI: Nigeria National Cereals Research Institute
PLAR: Participatory Learning and Action Research
Sawah: leveled, bunded, and puddled rice fields with water inlets and outlets
SMART-IV: Sawah, Market Access and Rice Technologies for Inland Valleys
SRI; Ghana Soil Research Institute
SSD: Sawah System Development
WARDA: ex short title of Africa Rice Center

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[4] [4] Sawah system development indicates the land reclamation and introduction of sawah components such as leveling, bunding, and puddling to farmer's fields in inland valley bottoms by using a powertiller. See Hirose and Wakatsuki (2002) for more details.

[5] IWMI will be entrusted with impact assessment of SSD

[6] Hirose Project was initiated in 1992 by late Dr. Shohei Hirose (professor emeritus of Nihon University) with the financial assistance of Ministry of Education, Culture, Sports, Science and Technology, The Government of Japan. Hirose Project is officially collaborated with IITA. Dr. Hirose organized a multidisciplinary study team to characterize inland valley ecosystems in Nigeria and Ghana. The major findings of Hirose Project were documented by Hirose and Wakatsuki (2002). Hirose Project has a lot of experience in action research on Sawah system development in Nigeria.

[7] See Appendix for implementation schedule

[8] Agro-ecological zones are determined by the length of vegetation growth period and rainfall. The West Africa sub-region has four major agro-ecological zones, i.e., equatorial forest zone; Guinea savanna zone; Sudan savanna zone; Sahel savanna zone, the agro ecological zonation presents a useful preliminary evaluation of natural resource potential for agriculture. See more details Windmeijer and Andriesse (1993) and Hirose and Wakatsuki (2002).

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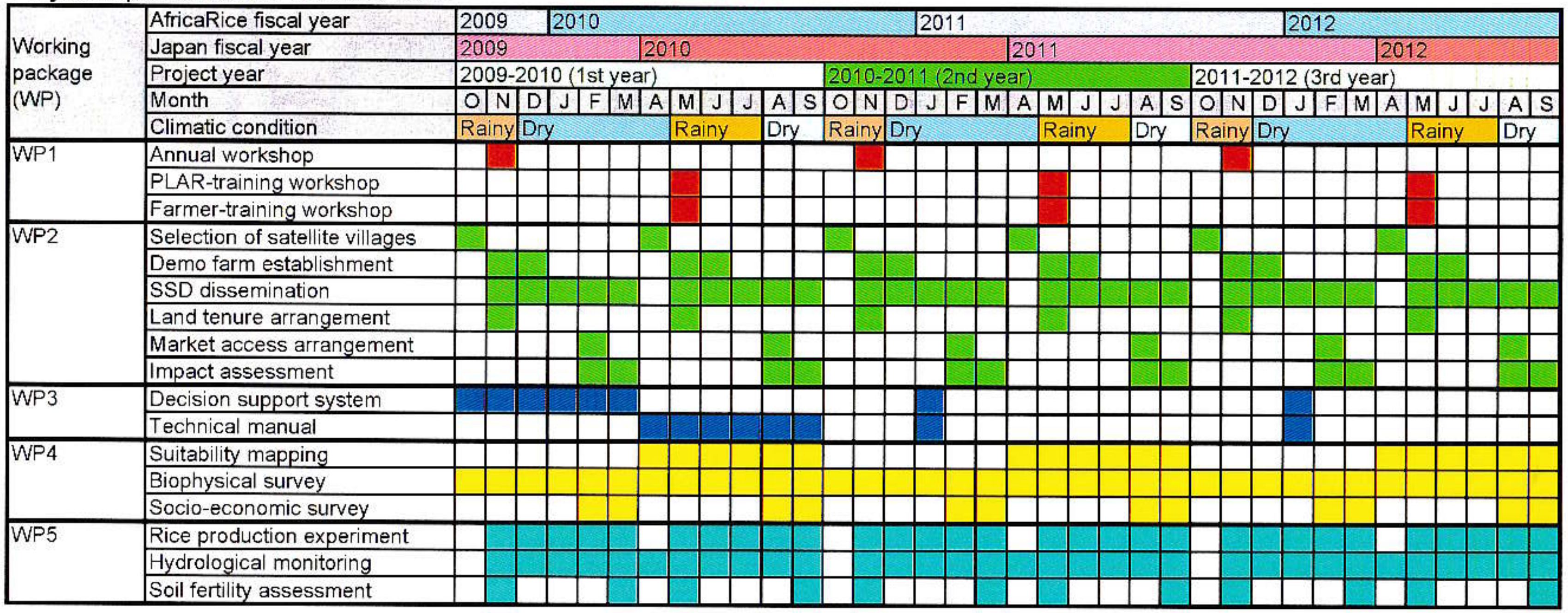
Project Implementation Plan 2009–2012



Annual Project Implementation Plan 2009–2010

Working package (WP)													
	AfricaRice fiscal year	2009			2010								
	Japan fiscal year	2009						2010					
	Project year	2009-2010											
	Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
	Climatic condition	Minor rainy		Major dry					Major rainy			Minor dry	
WP1	Launching workshop												
	PLAR-training workshop												
WP2	Selection of satellite villages												
	Demo farm establishment												
	SSD dissemination												
	Land tenure arrangement												
	Market access arrangement												
	Impact assessment												
WP3	Decision support system												
	Technical manual												
WP4	Suitability mapping												
	Biophysical survey												
	Socio-economic survey												
WP5	Rice production experiment												
	Hydrological monitoring												
	Soil fertility assessment												

Project Implementation Plan 2012–2014

Working package (WP)																									
	AfricaRice fiscal year	2012			2013												2014								
	Japan fiscal year	2012						2013												2014					
	Project year	2012-2013 (4th year)												2013-2014 (5th year)											
	Month	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S
	Climatic condition	Rainy		Dry					Rainy			Dry		Rainy		Dry					Rainy			Dry	
WP1	Annual workshop																								
	PLAR-training workshop																								
	Farmer-training workshop																								
WP2	Selection of satellite villages																								
	Demo farm establishment																								
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