PRODUCTOS	RESULTADOS	INDICADORES	
DUTPUT 1.1: Two communal irrigaiton systems supplying 85 farm producer families in two micro-watersheds. DUTPUT 1.2: At least 880 water collection and storage strucutres capturing rainwater and storing it in farms of selected families in the eight micr-watersheds. DUTPUT 1.3: At least 1000 farm families organized and trained in maintaining their communal water irrigation and storage systems	Outcome 1: Increased availability of water for small scale domestic and productive uses and reduced risk of water stress and drought <u>NOTE</u> : This differs from the Spanish version, which is reduced risk from climatically induced shortages of water for domestic and small-scale productive useage in upper part of 8 microwatersheds of the Estero Real watershed.	 Percentage of the farms in each microwatershed with access to irrigation thorugh hydraulic works built by project funds. <u>COMMENT</u>: This does not necessarily guarantee that access to the new water be socially and economically equitable, nor does it ensure that the hydraulic works are envimmentally sustainable. The evidence suggests that there are reosns for concern that the comonent wil lead to greater water conflicts due to the inequitable distribution and unsustainable use of more accessible water supplies in the targeted microwatersheds. Percentage of farms in each microwatershed whose use of wate is satisfactory according to techncial guidelines. <u>COMMENT</u>: This is an OUPUT - there are not data availbale to demonstrate that the risk has been reduced. There are also no data to demosnrate that the shortage of domestic water has improved thorugh the water capture strucutres, nor is there any expliti methods to show that domestic water supplies 	
DUTPUT 2.1: At least 1000 farm familias with agro-ecological transfrmation plans and using their own financial resources and credits for impelmenting progressive change. DUTPUT 2.2: At least 140 hectares in each micro-watershed converted to agroecological production in a way that is conscious of water useage and climatically <i>resilent</i> OUTPUT 2.3: At least 50 hectares protected in each micro- watershed with riverine forests and water recharge areas.	OUTCOME 2: Enhanced food security and eco- systemic resilience through agro-ecological practices and effective use of available water in the eight targeted micro-watersheds. NOTE: This is in contrast to the Spanish verison of the Prodoc which states, <i>Ecosystemically reslient</i> <i>agroecological practices increased for ensuring the</i> <i>effective use of water in the eight targeted micro-</i> <i>watersheds</i> .	2.1 Percentage of farm families in each micro-watershed implementing agro-ecological farm transformation plans in each micro-watershed. <u>COMMENT</u> : This is also an OUTPUT. The project has not provided data that demosntrate that the water is being used effectively and efficiently, nor sustainably. Furthermore, there are no data or baselines that are availbale for quantifying jsut what ecosystem reslience mean. 2.2 Increase in the percentage of land in each microwatershed with vegetative cover. While this is an admirable goal, it assums that an increase in vegetative cover is correlated with hydroulic recharge.THis is an assumption that cannot be supported based ont eh existing data and it	
OUPTUT 3.1: Local organizations in the eight micro-watersheds elaborate and implement their climate change resilent management plans in order to increase the retention of water, conservtiaon of soils and food security. OUTPUT 3.2: Instancies in which there is inter-institutional coordination in the municiplaities of El Sauce, Achuapa and Villanuevaof their governmental and non-governmental work plans. OUTPUT 3.3: Validates proposals for the normative instruments designed to develop <i>climate change resilience and for the</i> <i>operation of the watershed and mcro-watershed committees</i> <i>for the</i> Villanueva River. OUTPUT 3.4: Nine municiplaiteis in the Río Estero Real watershed incorporating climate change adaptation measures in ther municipal development plans, improved use and investments in water and related normative instruments.	OUTCOME 3: Capacity and institutional development in micro watersheds, municipalities and participant institutions. <u>NOTE</u> : The Spanis verison states: Institutional capacitides strengthened for incorproating the management of cliamte change risks into work plans, policies and normative instruments for the Villanueva River sub- watershed and the Estero Real River watershed. <u>COMMENT</u> : This is considered by the MTE to be an OUTPUT.	 3.1: A proposal, based on the project experiences, endorsed by the three municipalities outining the operational duties of the microwatershed committeees within the Villanueva River Sub-watershed. COMMENT: This is an OUTPUT. THere is no evidence at present that the output has led to a change in the way water is managed by these committees, and experiences from the Condega municipality suggest that there could be problems, unless some of the lessons learned are 3.2 Municipalities in the watershed with climate change adaptation measures their official plans and normative instruments. COMMENT: This is an OUTPUT. THere are no data demonstrating that these experiences (i.e., best practices) are contributing to the exected outomes or impacts of the project. 	
OUTPUT 4.1: A hydrological study of the lower Rio Villanueva watershed, identifying the hydraulic works requiered to reduce the flooding caused by the sedimentation in the upper watersheds. OUTPUT 4.2: Participatory monitoring of changes in the water flow, soil conditions and land use. OUTPUT 4.3: Electronic Information posts in each microwatershed focused on presenting relevant global and national information, digitizing the local monitoring data, preparing maps showing land use changes, water flows and soil conditions for the protagonist families, loal organiztions and users of the National Environmental Information System (SINIA).	OUTOME 4: Results and lessons learned from the project disseminated in relation to building climate change resilience in vulnerable rural areas.	4.1 Protagonists measuring the quality and quantity of water, the condition of soils and land use changes in each microwatershed. <u>COMMENT</u> : This is an OUTPUT. 4.2 Lessons learned in each of the 8 micro-watershedsand the Villanueva sub-watershed made available on the SINIA web site. <u>COMMENT</u> : This is an OUTPUT. THEre is no robust framework for guranteeing a systematic compilation of lessons learned based on an adpative management approach. At mid term, there are no lessons learned psoted on the SINIA web site.	

PROGRESS SINCE INCEPTION	BASE- LINE	INDICATOR	STAT	TUS OF IDENTIFIED OUTCOME
 Family agro-ecological transformation plans (920) for crop production. 	400	Number of farm families in the targeted micro-watersheds with at least one annual harvest.	S	<u>Incipient immediate Outcome</u> – Awareness raised in 920 families, but most importantly, interview and site-visit sub-samples indicate behavioral changes in all but one protagonists interviewed. Anecdotal evidence from several protagonist leaders indicates that while most protagonists are changing their unsustainable practices, there are still some who are reluctant and only involved with the project to get short-term benefits.
2. Two communal irrigation systems benefitting 100 families with an annual harvest.	0	Percentage of farms in each micro- watershed with access to irrigation by means of hydraulic works built with program funds.	MS U	In theory this is an <i>immediate result</i> . However, there are no guarantees about equity and distribution of the newly routed and accessible water and the aspersion irrigators are considered perverse incentives.
3. A total of 74ha under irrigation with an average of two harvests per year (in 2013) in the Las Mercedes mws	67.55 ha	Surface in hectares to increase low risk	MS U	In theory, this is also an <i>immediate result</i> . Again, there are no guarantees that the water will be shared equitably and the same comment applies to the aspersion devices.
4. Water intake structure at Mercedes Centro, conducting 30 l/sec for irrigation via aspersion and benefitting 35 farm families.	0 lts/seg	Amount of water (lts/sec) carried through the communal irrigation system infrastructures.	U	Perverse Outcome There are no guarantees that the distribution will be equitable or effective as an adaptation measure due to the potential for accelerated evaporation y evapotranspiration.
5. A tank with 25 m ³ water capacity fills with intake to give water for 17 families to give water to their cattle and 22 communal washing posts.	0 lts/seg	Amount of water (lts/sec) carried through the communal irrigation system infrastructures.	S MS	<u>Incipient immediate Outcome</u> . Savings in water storage due to the concrete tanks and communal water systems for washing and livestock and an increase in food security. Nonetheless, there are no guarantees that the water will be distributed equitably.
6. Water storage area in the Ismael Castillo cooperative receives 50l/sec for irrigation through canals constructed by the project.	0 lts/seg	Amount of water (lts/sec) carried through the communal irrigation system infrastructures.	S MS	<u>Incipient immediate Outcome</u> ; More efficient water distribution, but no guarantees that the water will be distributed equitably.
7. Communal irrigation system at Salale with transport capacity to deliver 30 l/sec, benefitting 32 farm families.	0 lts/seg	Amount of water (lts/sec) carried through the communal irrigation system infrastructures.	S MS	<u>Incipient immediate Outcome</u> More efficient water distribution, but no guarantees that the water will be distributed equitably. Aspersion irrigators are a perverse incentive.
8. 36% water capture and storage structures to catch rainwater are constructed in the communities.	5%	Percentage of farmers in each micro-watershed, the water use of which is rated as satisfactory in relation to the relevant technical guidelines	Ο	<u><i>Output:</i></u> There is no measurement of whether the water use is satisfactory nor what are the results from this output?

ANNEX 4: FINDINGS ON PROGRESS AND OUTCOMES IN GREATER DETAIL

9. 316 water capture and storage devices to capture rainwater in the communities.	0	Number of water harvesting structures installed and working at the micro-watershed level	S	<u>Incipient immediate Outcome</u> – Water savings due to communal water systems and increased food security. However, lacking is evidence that quantifies these savings and to demonstrate that the ponds do not results in greater evaporation and evapotranspiration in the micro watershed.
10. 91.54 % of all agro-ecological transformation plans developed.	5%	Porcentaje de familias campesinas en cada micro-cuenca implementando planes de transformación agro-ecológica para granjas.	0	<u>Output</u>
11. 920 agro-ecological transformation plans developed (PTAF) formulated (over 90% of the target) Achuapa: 375 plans, El Sauce: 270 plans and 275 plans in Villanueva.	0	Number of farming families with agro-ecological farm transformation plans	0	<u>Output</u>
12. 920 plans formulated for agroecologcial transformations in 2.059 hectares, surpassing the final target significantly.	01	Area (ha) of agro-ecological transformation plans developed in farms	0	Output
13. The objective to reforest and protect recharge areas exceeded the target from between 100% and 172.5%.	25%	Aumento en el porcentaje de tierra en cada micro-cuenca con cobertura vegetal.	0	<u>Output</u>
690 ha of gallery forest replanted and protected now increased to 4,107 ha. In the 8 micro watersheds.	0	Increase in percentage of land in each micro-watershed with vegetation coverage.	S	<u>Immediate, incipient result</u> In addition to the natural regeneration, the frequency of uncontrolled fires have been reduced and this is especially true for the recharge areas that have been fenced to protect them from grazing livestock and from iguna hunters who burn the forest to clear the animals out of these areas.
15. Delivered, patio and household improvement interventions.	0	Number of families that benefit with home and patio investments through the Farm Transformation Plans (PTAF).	0	<u>Output</u>
16. Eight micro watershed committees formed in three municipalities.	0	An experientially-based proposal endorsed by three municipal governments for the operation of a Sub-Watershed Committee for the Villanueva River basin	0	<u>Output</u>

¹ The goal is not specified in the available reports.

17. CC adaptation plans formulated in thee municipalities, thereby assisting them to collect information that can raise awareness to the dangers of flooding.	0	Municipalities in watershed with climate change adaptation measures included with their official plans and related	S	<u>Output/Incipient immediate Outcome</u> Approved enforced, and that they will be effective. However, the change in institutional behavior is considered as being positive and therefore an immediate result.
 Dissemination of the advances and achievements of the Project through bulletins and web site. The web site although preliminary is operating. Reports and publication listed on the web site. 	0	Lessons learnt in eight micro- watersheds and the Villanueva River Sub-Watershed available in SINIA and other web sites and disseminated through exchange workshops.	0	<u>Output:</u>

RECOMMENDATION	Action	RESPONSIBLE(S)
1. Revise and	1.1 Review and update the original risks and assumptions	Entire team in
update the	1.2 identify the links interconnecting the outputs and outcomes expected results	consultation
intervention	chain	with MARENA
logic of the	1.3 Improve the indicators to be SMART and thus measure the changes detected at	and UNDP
project and	each link in the chain of causation.	
develop an	1.4 In addition to identifying whether the results produced, systematize how these	
operational	were achieved, including lessons learned.	
framework for	1.5 Integrate the approach both in the monitoring and management of UNDP, as	
promoting	the Program Management Unit to improve capture the lessons learned from the	
adaptive	links in the results chain.	
management		
2. Expand the	2.1 Include economic dimensions such as the base level of family income before the	Gender expert
parameters of	project.	and Mi Familia
the baseline	2.2 Include physical and biological indicators such as the groundwater level of	Protagonists,
	monthly family wells in fecal coliform in them.	extensionists,
		MINSA, TASCA ²
		and Health
		brigades
	2.3 Measure baseline wildlife and reforestation changes, changes in the fractal of	UNAN León
	ecosystems and the distance between them	and new
		students (June
		2014)
3. Eliminate and	3.1 Gradually replace sprinkler irrigation with friendlier adaptation such as leaky	El Responsable
substitute	irrigation techniques.	para el
perverse	3.2 Ensure equitable distribution of water driven by project interventions.	Componente 2
incentioves	3.3 Develop strategies for CAP based on the experiences of water management in	

ANNEX 5: SUMMARY OF ACTIONS ¹ TO BE TAKEN BASED ON THE MTE'S RECOMMENDATIONS.

¹ All recommendations should be executed prior to June 2014 ² The Campesino Health and Water Working Group (TASCA) is an NGO that has been working in Nicaragua with the MOH since 1989 (<u>www.tascanica.org</u>) and provides simple equipment to measure water quality in terms of fecal coliform contamination with <u>no cost</u> for the project, provided that the MINSA is involved **(CONTACT:** info@tascanica.org).

perversos	Condega or elsewhere, and measure their effectiveness in reducing conflicts.	
	3.4 Establish a baseline related to the current conflicts over water resources in the	
	8 micro and effectiveness of its resolution	
4. Improve the	4.1 Improve the focus of the monitoring system to be dynamic, interactive and user	Responsible
monitoring and	friendly.	staff member
information	4.2 The maps should especially be interactive and disseminated as a learning tool,	for Component
system markedly	rather than just a static information model.	4
	4.3 Update project data and publications from the same.	
	Focus only 4.4 Website SINIA in the specific contributions of the various	
	institutions and NGOs to draft and hanging links to websites to reduce the weight	
	of the files in the SINIA.	
	The monitoring system should also be updated to be more user friendly and	
	especially the policy-making and planning process.	
5. Popularize the	5.1 Improve dissemination mechanisms and popular dissemination of component	Responsible
data and	4, including the production of models in each watershed, collection of traditional	staff member
information to be	practices, coloring books or other forms of popular dissemination	for Component
disseminates so	5.2 Suggest and discuss with the players and improve.	4 and the
non-technical	5.3 Measure whether the approach has contributed to a better understanding and a	information
people can	more active participation of stakeholders.	nodes
understand		
6. Develop	6.1 Develop some innovative indicators to measure these elusive and metaphorical	Project
indicators and	concepts such as resilience and sustainability ³ .	technical team,
methods for		MARENA and
measuring		UNDP
metaphorical		
terms such as		
resilience		
7. Develop better	7.1 Review of PAGRICC verification forms and adapt them to current leaves Estero	Technical
tools for testing	Real project as necessary to ensure a simple and useful format for the project,	team and
interventions	7.2 Compile qualitative and quantitative data on the effectiveness of interventions	extenionists

³ Ej., Boyd y Folke 2012; Cabell y Oelofse 2012; Gunderson et al. 2006, Cumming et al. 2005; Walker et al. 2004 for reslience, See Ryan et al 2014 pfor a better definition of sustainability.

	and integrate the results into the adaptive approach to Recommendation # 1 and # 4.	
8. Improve Project efficiency	 4. 8.1 Ensure that the computer has adequate transportation to not waste their time waiting for transportation in the field. 8.2 Ensure that the extension continue to the end of the project as links between the project and the protagonists in each watershed and seek ways to get to work after the project ends. 8.3 Revisit the lessons learned about the loss of seeds or other inputs that are not repeated. 8.4 Eliminating approach involving students in formulating plans agro-ecological transformation Ensure that participate in the collection of baseline and monitoring biological- 	Project coordination Unit, MARENA and UNDP
	cological parameters outlined in Recommendation # 4, including a study of the contribution of the lagoons built to supply cattle.	

ANNEX 6: LIST OF PEOPLE INTERVIEWED

Name	Organization	Position
Minister Juanita Argeñal	MARENA	Minister del MARENA
Denis Fuentes	MARENA	General Director, Planning MARENA
Suyén Pérez	MARENA	General Director General of Climate Change MARENA
Javier Gutiérrez	MARENA	Technical Director of Climate Change MARENA
	MARENA	Departmental Delegate MARENA León
José Rodríguez	MARENA	Departmental Delegate Chinandega
María Fernanda Sánchez	PNUD	Program Officer for Environment, Energy and Risk
		Management
Etianne Clevy	PNUD	M & E
Karla Vanessa Rodríguez	UGP ¹	Estero Real Project Technical Coordinator
Violeta Halleslevens	UGP	Administrator
Roberto Castillo	UGP	Estero Real Project Hydraulic works supervisor
Ing. Hugo	UGP	Hydrologist
Lic. Germina	UGP	Gender expert
Luis Picado	UGP	Agroforestry expert
Luis Felipe Pérez	UGP	Agroforestry expert
1	UGP	Agroforestry expert
Glenda Oviedo	SINIA-MARENA	Responsible, SINIA Northeast Pacific Zone
Hector Moreno M	UGP	Extensionist
Augusto Valle F.	UGP	Extensionist
Juan de D. Fletes C.	UGP	Extensionist
Óscar R. Lezama P.	UGP	Extensionist
Iuan R. Martinez P.	UGP	Extensionist
Marlon Moreno	UGP	Information Node
Onevda CastilloT	UGP	Information Node
Danvs Masis M.	UGP	Information Node
Klenver Velasquez A	UGP	Information Node
Miguel Garcia P.	UGP	Information Node
Jamiel Luna B	UGP	Information Node
Jose G. Romero B.	UGP	Driver
Alfonso	Salale	President CAP Salale, Protagonista
Uncle of Alfonso	Salale	Protagonist
Antonio	Mercedes Central	Protagonist
Sra. Antonio	Mercedes Central	Protagonist
Necdar	Mercedes Central	Protagonist
Sra. Necdar	Mercedes Central	Protagonist
Juan Ramon Urbina and wife	Salale arriba	Protagonist
Sra. Urbina	Salale arriba	Protagonist
Fire Prevention Brigade	El Tule	Protagonist
member		
Health Brigade Memeber	El Tule	Protagonist
Woman head of household at	El Tule	Protagonist
second horseback visit	Li i uic	Totagonist
El Doctor	El Tule	Protagonist 5th farm visited by horseback
Dueño	San Nicolás	Protagonista
Dueño	EL Rodeíto	Protagonista
Dueño	Pajarito	Protagonista
Dueño	EL Rodeíto	Protagonista
Dueño	FL Rodeito	Protagonista
Ducho	EL ROUEILO	Tiotagonista

¹ Unidad de Gerencia del Proyecto

San Ramón	Protagonista
San Ramón	Protagonista
San Ramón	Protagonista
Los Chupaderos	Protagonista
Los Chupaderos	Protagonista
Mercedes Central	Protagonista
Comarca El Tule	See the list that follows for the participants in the
	assembly at El Tule
	San Ramón San Ramón San Ramón Los Chupaderos Los Chupaderos Mercedes Central Comarca El Tule

ANNEX 7: Photos of the Field Visits

Annex 7 presents some photos taken by the consultant during different field trips to the Project sites. The first photo was taken near sunset in January 2014 en the high part of the Los Genizaros microwatershed (elevation c. 800 meters) in the El Tule comarca. The foreground of the photos shows the numerous aquatic recharge areas in the Rio Villanueva sub-watershed (in the middle of the photo), while the waters comprising the downstream Estero Real can be seen in the background. The tall mountains behind the Estero Real delimit the border between Nicaragua and Honduras.

MUNICIPALITY:	Villanueva
MICROWATERSHED:	Los Genizaros. Comarca de El Tule,
INTERVENTION	The field trip on horseback was arranged by the leader of El Tule comarca and several other
ТҮРЕ	members of the community, and several members the project technical team, in order to visit various projects featuring agro ecological interventions, protection of aquatic recharge areas and verifications of local organizing capacities.
DATE:	16.01.14



MUNICIPALITY:	Villanueva
MICROWATERSHED:	Los Genizaros. Comarca de El Tule, looking toward the Rio Villanueva and the Los Chupaderos micro watershed
INTERVENTION	The arrow in the photo indicates the location of an abandoned gold mine in the upper Los
ТҮРЕ	Genizaros micro watershed which is now under negotiations that could lead to resuming production. The boys in the photo are grandchildren of the owner of the mine. Los chavalos er la foto son nietos de la dueña.
DATE:	16.01.14



MUNICIPALITY: MICROWATERSHED: INTERVENTION TYPE DATE: Villanueva Los Genizaros. Comarca de El Tule, Priority water recharge área with fence provided by the project 16.01.14





MUNICIPALITY: MICROWATERSHED: INTERVENTION TYPE DATE: Villanueva Los Genizaros. Comarca de El Tule, Assembly held with over 65 protagonists at El Tule. 16.01.14





Achuapa



MUNICIPALITY:Achuapa MICROWATERSHED: TYPE OF WORKS: PROTAGONIST:

DATE:

El Coyolar Protection of aquatic recharge areas:

'I have 100manzanas (mz) of land, but it is part of a larger cooperative with some 1000 mz. My neighbor (top left photo) has another 85 mz., so we are making a big difference by protecting these lands. – Mr. Teofilo 19.12.13



MUNICIPALITY: TYPE OF WORKS: PROTAGONIST:

DATE:

Achuapa

Improved patio and forage grasses

We have 16 manzanas, but we only work the pasturelands. We established our pasture with improved grass this year with help from the Project and we were able to restore and area that was totally abandoned-Sra. Julia Elena. 19.12.13



MUNICIPALITY: INTERVENTION TYPE:

Achuapa Cattle watering pond, riverbank protection, riparian forest protected and improved pasture grass.



MUNICIPALITY: El Sauce

Microwatershed: Las Mercedes Centro

Intervention Type: Pressure test of the water supply network build by the Project and which feeds irrigation aspersion irrigators. Photos taken at mid-morning.



MUNICIPALITY: EL Sau

Microwatershed: Las Mercedes Centro

Intervention Type: Communal watering troughs for cattle, family garden plot (Necdar, one of the leading protagonists from the community) with plants provided by the project, community leader watering using an aspersion irrigator (background), Don Antonio, protagonist leader with his aspersion irrigator and communal laundry site built by the project.







Salale



MUNICIPALITY: El Sauce

Microwatershed:

Intervention Type: Canal and pipe constructed by project funds, water retention structure with hydraulic engineer and head of the microwatershed committee protagonist Don Salvador with the hydraulic engineer for the project Don Roberto. Waterfall and protected recharge area protected by the Project (was to be dynamited by the Millennium Challenge Project).



MUNICIPALITY:

El Sauce

Salale

Microwatershed:

Intervention Type:

Family patio garden and orchard as part of a farm agro-ecological transformation plan for Juan Ramon Urbina and Mrs. Urbina, protagonists.



MUNICIPALITYVillanuevaIntervention Type:Protection of Riparian forestsDATE:18.12.13



Rainwater collection system with concrete storage tank. The roof and protection are added value by the protagonist and this is a good photo showing sustainability of an investment!



Protected riparian forest.



Improved pasture grass for cattle.



First encounter with the Project team at the Project office in El Sauce, December 2013

