

TREATED WATERS: COMMUNAL PARTICIPATORY MANAGEMENT AND ITS IMPACT ON HUMAN DEVELOPMENT AND ECOSYSTEMS

Case: Farmer Community Lambayeque – Perú

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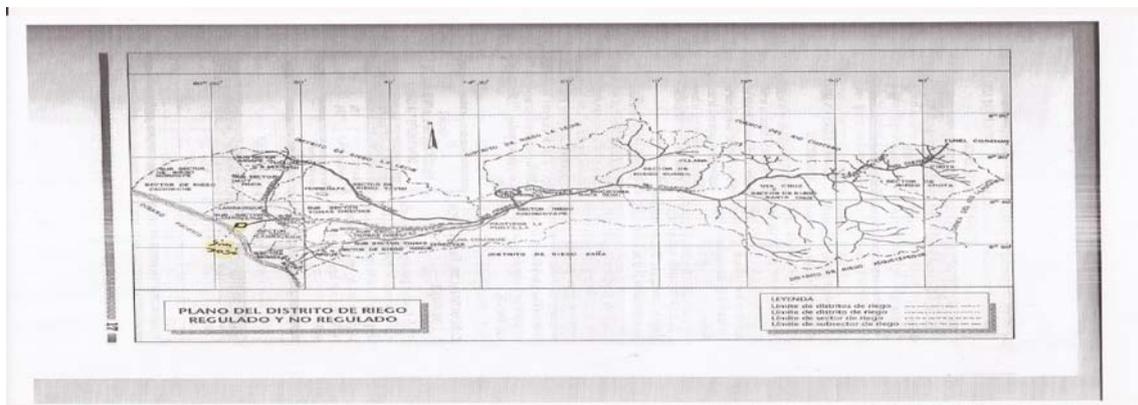
CES Solidaridad/ GWP-Perú

The present study has been carried out by invitation of GWP Sudamerica. It shows the farmers' management capacity on the use of treated wastewater to generate productive, social, economic and environmental changes. Methodologically, we worked with a sample of 100 people, having as a guideline, the initiative of organized farmers to come out of poverty, using treated wastewater for agricultural production.

1. CONTEXT: SCENARIO

The study area, San José/Pampa de Perros' farmer community (1), is located at the lowland valley of Chancay-Lambayeque watershed, one of the four most important watersheds of Lambayeque. It has two differentiated areas: the coast and the mountain range. The first has a regulated irrigation of 98,000 hectares and its water is stored in the reservoir of Tinajones, (230,000,000 m³); rice and sugar cane are cultivated and they consume 89% of water resources, affecting small farmers such as the ones in San José. The other area is the mountain range, where subsistence agriculture depends on rainfall and its waters are poured to Tinajones, located at the coast. Here, 75% of its people are poor and its economy is supported on staple products, cattle ranching and temporary jobs at the coast. There is a coastal vision of the watershed management; the actors at the source of water (the farmers from the mountain range) are ignored.

Chancay-Lambayeque Watershed



- (1) This prairie (pampa in spanish) includes Baldera, Colector and Gallito sectors, and owes its name to the amount of dogs (perros in spanish) that were on the surroundings, looking for waste and corpses brought by the treated waters' drain emitter of Chiclayo city.

One of the critical aspects of this watershed is the scarcity of irrigation water; which will get worse when population grows; more population, more water demand. When water volume evolution is analysed, it is observed that its availability decreases. Mclín Falkenmark estimates that for year 2025 there will be only 617 cubic meters per capita (*Imar Costa Norte, Rev. 6, 1996*), meaning that water scarcity will be very high. Even with these projections, there is no policy to use treated waters for agriculture. The initiative of San José farmers, demonstrates that these waters can be used to irrigate sandy soils for food production, and it is also a climate change adaptation measure.

2. THE PROBLEM.

Regional authorities proposed that wastewater treatment of Chiclayo city, going through Pampa de Perros (land of San José farmer community), flow to the sea. The afforestation of this sandy pampa was considered the best measure, without taking into account that 60 migrant families of Cajamarca, 15 years ago, had settled in the collectors leading the wastewater towards the Pacific Ocean. Farmers cultivated food products, without consent of Regional Authorities; they got used to “live” with that disgusting water for the need to survive. But they discovered that wastewater had two virtues at once: they could irrigate crops in absence of other water source and they were a rich and natural fertilizer. By damming water to their plots, they obstructed the emitter that would drain into the sea, causing floods on city streets 5 km away; and at the same time it was a place of infectious diseases related to consumption of contaminated agricultural products. This worsened in the years 1983-84, with cholera epidemic. Authorities took advantage of this opportunity to move them out and start the treatment with the initially raised purposes. Facing this situation the farmers undertook the struggle for: a) remain in the area, community land, and b) that treated waters were used for agricultural production instead of forestation, as Chiclayo Municipality proposed. The novelty of farmers’ proposal was that treated waters should be used for agricultural production under community management. The mobilisations and coordinations were the instruments which facilitated that farmers’ proposal was included on the Master Plan of Chiclayo Municipality, whose funding was being discussed with the German Bank KfW.

3. DECISIONS AND ACTIONS TAKEN.

The actions taken to adapt to the problem were:

Phase 1: *The debate about the importance of wastewater use.* The public institutions (SEDALAM and CORDELAM) started to worry about the misuse of Chiclayo wastewater at Pampa de Perros. The opposition argued with a reasons mixture, where political and environmental health issues played a role but the imminent danger of Chiclayo’s main emitter obstruction had more relevance. At that moment, CES Solidaridad proposed an event called “Future Development of San José farmer community: Wastewater”, with the participation of public and private sectors; they exposed their alternatives and treatment projects were accelerated, which global conception “slept” in public sector. The debate was focused on

promoting the treatment, but waters would be used for agriculture and not for forestation as the Municipality proposed. The essence of this forum was to put the treatment idea on the institutions' collective thinking, and create a Multisectorial Commission to boost coordinations around the problem.

Phase 2: *Mobilisations of farmers, led by its community.* To nail down farmers' proposal implied that leadership was on them and the key instrument was the farmers' technical proposal, to be discussed and debated together with the one of the Municipality. The technical team (Solidaridad NGO and professionals from a local national University) took its formulation, with farmers' involvement from information and irrigation infrastructure design to its management at regional authorities. The mobilisation generated a collective consciousness in favour of farmers. The participation of diverse actors of regional society was essential to that Municipality started to change its previous design. A Technical Commission, integrated by Chiclayo Municipality, the Region, CES Solidaridad and Engineering Society, was created to refine the farmers' proposal.

Phase 3: *Arrangements between diverse authorities and civil society.* The coordinated mobilisation of diverse local actors around farmers' proposal had as a coordination space, the Multisectorial Table "wasterwater treatment for agricultural development". On the other hand, the German Bank KFW asked that for funding, the community would give 146 hectares of its land to build 18 treatment pools. These facts facilitated the negotiation between the community, owner of the land, and the Municipality, in favour of the former. A formal agreement was reached, treated waters would be used for agricultural production, which control and distribution would be assumed by the community with technical and social support from CES Solidaridad. As a result of this phase, the Municipality technicians with support from the German Bank KFW, finished the proposal's final formulation that was claimed by farmers.

Phase 4: *Execution of works in agreement with San José farmer community.* The execution had two stages: *Stage I*, building of the first pool in Baldera/colector with resources from a Cooperation Agency (Pan para el Mundo), CES Solidaridad and the Region; there was an advance of 40%, but it had more the character of "institutional pressure". Later the following pools came with funding from the German Bank KFW with an approximate amount of 18 million US dollars. In this stage 8 pools were built: 4 primary lagoons and 4 secondary, to irrigate 250 to 350 hectares, approximately. *Stage II*, was carried out in 1998, with the building of 10 of the 12 projected lagoons of 800 liters per second, to irrigate some 400 hectares.

Nowadays, the San José community has two systems of sewage treatment: "Pampa de Perros" and "San José".



Farmers' practice has demonstrated the potential of wastewater to incorporate sandy pampas to agriculture, in desertic areas where water scarcity make human coexistence impossible; giving economic value to these lands are strategies to solve rural poverty. Even with this potential, there is a lack of public policies to use wastewater; many cities, departamental capitals, do not have proposals for the wastewater treatment to the development of agricultural activity; only in some cities such as Lima, wastewater is used for industrial parks forestation. There is no political vision that farmers' management can be used as means of escape from rural poverty in urban desertic areas. Governmental policy promotes mainly the extensive irrigation of desertic areas, which only benefits large investments for export, such as the case of Chavi Mochic in Trujillo, and Olmos in Lambayeque. Likewise, there is no strategy to have an integral watershed approach on the urban water resources management, because this space -the city- is part of a natural watershed, and it is influenced and it influences on the quantity and quality of the wastewater irrigation resource and the sustainability of the system.

4. RESULTS.

¿Which are the impacts reached by the proposal developed by farmers?

R1: *Farmers manage water efficiently for agricultural production: livestock, pasture and milk production, organised communally.* San José farmers' community has been organised in 5 Local Administration Committees (CDL); Baldera, Colector and Gallito, are organized in Committees; its decisions on water management are under the responsibility of each of them. This organisation allows that decisions on water management, on communal management and other resources are decentralised; this organisation form keeps communal integrity, despite some limitations on water management and distribution, and property transfer to the interior of communal territory; control and vigilance are "more alive"; control to water distributors can be done immediately. On the other hand, the CDL also promotes product merchandising by organising in associations por different activities. At present, the farmers' community is part of the Association of Ecological Producers, a second level agency. Finally, organisational capacity has also led them to develop its agreement capacity with different actors operating in the

area; organisational consistency was the key to that mobilisation was successful to achieve that treated waters are used for agricultural production.

Leaders are elected democratically every two years, under direction of an electoral committee, elected in the same act of communal election. This democratic process strengthens communal functioning; participation at meetings reaches 94% (CESS: *Survey 2012*).

Treated drain on the “Pampa de Perros” system is used completely for agricultural irrigation, benefiting approximately 380 hectares of cultivated area. From July 2000, an average of 50% of treated drain at “San José” lagoons is used for agricultural irrigation on about 400 hectares. Currently, organised management is taking care of the 780 irrigated hectares. However, some 400 liters per second of treated waters go to the sea, because irrigation infrastructure is lacking. Farmers have presented expansion proposals for irrigation channels; so far State agencies have not given an answer. These three sectors (Baldera, Colector and Gallito) have a total of 2,487 hectares-desertic areas that could be incorporated to crop; the goal of the systems is to irrigate 1,484 arable hectares, but with the building of drain and irrigation channel network some 2,000 hectares could be irrigated (CESS: *Work Document, San José Diagnosis, 1998*).

These lands had very high salinity, average of 16 mmhos/cm (47% had more than 16 mmhos); which has been going down with drainage, soil washing, organic fertilizers. At present is on the range of 2 - 4 mmhos/cm, making the sandy pampas of Baldera, Colector and Gallito sectors productive (CESS: *work document 2001*)

Pampa de Perros and San José



Crops are diversified: alfalfa and pastures occupy 76% of the cultivated area, which is related to milk production; these sectors are now characterized by milk production that is sold to the company Gloria and Nestlé; the other crops occur in a smaller scale, such as flowers, yellow corn, Escobero sorghum, in a few cases rice is cultivated. The organic quality of soils has increased, from a fertility of 0.5% to 3% of organic matter; this process has been achieved applying organic inputs, and in the case of livestock including improved bellies of dairy cattle, specifically Holstein breed. In terms of production efficiency, the result is: alfalfa (1986) from 45 ton/has to 85 ton/has (2012). The same occurs on milk production: from 1,620 liters/cow/year to 3,600 liters/cow/year. There is an improvement on water management,

planning and equitable distribution; it is expressed when they say: *“we irrigate according to our turn...water has to reach everyone... however for those who live very far there are difficulties, it reaches in small quantities, that is why there is some discomfort... the ones who live closer to the pool, are the ones who benefit with larger water quantities... because of the difficulty that those who live far from the pools have, since small quantities reach, they have built small dams to ensure the irrigation...”*

This treated wastewater management capacity of organised farmers in communal committees, is expressed on three dimensions: a) a communal organisation decentralised by sectors under the direction of community headquarters, that establishes rules and management practices more consistent with the worldview of peasants; rules fulfilled on resource use, although there are also distortions on the management of resources collected because of water use; but above that, water use planning shows the efficiency and effectiveness on the distribution for everyone; b) a vision of cooperation with public and private agencies, without compromising the community's autonomy on water use; 72% of respondents do not accept State presence on water resource management; community considers that the fact of have yielded 146 hectares for the construction of treatment systems, gives them the right to manage water use and distribution, which shares go to the central community budget, *“we do not agree with the State intervention on water distribution, because there would be a lot of corruption on the distribution and the price of water would be more costly, that is why we do not accept the State presence; but we accept that it comes to do work for the area...which is lacking at present...”* and finally, c) there is a leadership capacity created by an organisation, CES Solidaridad; managerial staff that formed with the method “farmer to farmer” and they have taken leadership, giving a communal management more related to urban market, with a conception of a “modernizing” community. It is also important to point out, that efficiency on water distribution has difficulties, especially when irrigation channels are rustic. To increase their efficiency level they have strengthen its local organisations, which allow them to participate and to keep the trust on its distribution, reducing the loss on a lower level, approximately 10% (*security guard information*).

R2: *Farmers increase employment and income, using water rationally.*

Employment. The changes produced on employment and income are very significant; originally 60 migrant farmers came, then more came, 76% from Cajamarca; in 1986 there were already 176 farmers that owned communal lands, cultivating food products on collectors that carried wastewater to the sea. In 2012, 316 families are registered, although informally they go up to 624 families (*CESS: survey 2012*). Each family is composed of an average of 6 members, making a total of 1,896 inhabitants on the three sectors. Employment has increased rapidly, to the extent that 65% of the workers recruited by farmers are relatives, that come from the mountainous region; they come motivated to take care of the house and work on the “chacra” of their “countrymen-relatives”, *“when we need manpower, we call and bring our relatives, our countrymen; they work and receive a salary of 25 soles per day and they take care of our houses that are here in our “chacra”... We (owners) live in Chiclayo, Ciudad de Dios or Pimentel...”*. Many of these people, start to get into the same logic of social ascent that the first settlers migrants, they raise some dairy cows (1 to 2), they sell pastures, they have poultry

and in this way they buy $\frac{1}{4}$ to $\frac{1}{2}$ hectare-plots, and become informal landholders without the communal character.

These workers are hoping to stay in the area as smallholders sharing “*some pieces of land*” from its owner relatives; the latter have an average of 3 cultivated hectares. For this reason, the 780 productive hectares are generating some 1,560 jobs; from these, at least 40%, will become formal smallholders, because they are relatives of landholders; which in chain, will also generate new jobs, not only at the agricultural production level but also at the dairy cows care and milk level; additionally alfalfa sale is becoming an important commercial activity for Chiclayo city. According to the interview, settled farmers, which are officially 316 families, have 3 workers that are relatives, which means some 948 families employed on the three sectors.

As a consequence, if we sum up the 1,560 employed people, producing an average of 2 hectares, plus the 948 workers without plot, the area would be employing **2,508 people**, on a farmer community with uncultivated land, but that has known how to develop coordinated proposals to take advantage of Chiclayo city’s treated wastewater for agricultural development to feed the population; and indicating that the exit of rural poverty in the coast, is on using the wastewater of capital cities, or intermediate cities, treating them for agricultural activity.

Income. Another change of great impact is the family income generated by agricultural activities, irrigated with treated wastewater. The central activity is cattle ranching; the cattle population has increased on 197% from 1998 to 2011: from 1,185 cattle to 3,510 (*CESS: The conquest of the desert by farmers, 2011*).



These three sectors of the farmers’ community produce milk to be sold to companies such as Gloria and Nestlé, through gatherers. The 59% of ranchers have improved their cattle, in some

cases including Holstein breed (45%). According to informants they are producing an average of 20 liters/cow/day, which are first and subsequent lactations; this relatively low production is a consequence of feeding habits, management and climate, which is very variable specially on dry season. At this level, cattle ranchers require technical support, which is lacking at present.

Milk production per family

Number of cows / average / family	Production/ cow/day	Production/ day	Price/liter (soles)	Income (soles/day)	Total income per month (soles) (30 days)
08	Average: 15 liters	120 liters	1.02	122.4	3,672
	Minimum production: 6 liters	78 liters	1.02	79.6	2,387
	Maximal production: 25 liters	200 liters	1.02	204	6,120

CESS: survey 2012.

When we analyse family income from a sample of 100 farmers, 32% has an income from 1,000 to 2,000 nuevos soles monthly, 39% from 3,000 to 4,000 soles and 29% from 5,000 to 9,180 soles monthly (CESS: Survey 2012). In dollars, the average is 755 \$ US monthly (exchange rate: 2.65 soles/dollar).

This family income increases with complementary activities, such as the daily sale of alfalfa, and other food crops. This significant change on the increase of family income is expressed on the educational level of children, with 37% studying in private schools and 63 in public schools. Likewise, 25% of the youth study at private universities: *“Now we are different, our life is now positive, we are growing and educating our kids... the oldest studies at SENCICO, the other studies accounting at Sipán private university, and my other daughter also in Sipán, studies psychology”*. This change on life conditions, also shows on housing, a 93% have their own home and live in surrounding cities or in Chiclayo city; regarding medical assistance, 56% prefer to go to private clinics (CESS: survey 2012).

These indicators show that migrant farmers that came to sandy pampa, unproductive, effectively have conquered the desert, using treated wastewater for food production; this bet is underway with positive results. Water, as they say, *“is life, and you have to take care of life, otherwise we die”*. These indicators also show that poor people can also be citizens, with better life conditions, when natural resources are used with a vision on the future.

R3: *The integrated water resources management allows environmental sanitation and a balanced ecosystem management.* Farmers had as the main water source for crop irrigation,

the drains from Chiclayo city; "Pampas de Perros" was the centre of infectious diseases, 100% of agricultural products were contaminated and 65.88% of the population parasitized (GTZ-PROAGUA, 2001). The authorities answer was to move out the farmers; there was no proposal of wastewater treatment for agriculture, integrating urban and rural by using that resource for an integrated solution both for the environment and for improving life quality of poor farmers.

The farmers' proposal of using treated waters for agriculture, and reforestation of their own plots, has produced fundamental changes on the environment; *"we are improving pollution in some way... we are doing good to the surrounding cities, because now we use those waters that were useless before, and now we use them for agriculture and cattle ranching, although, we have to improve... Previously there was a lot of garbage here, everything was filthy, now there is no garbage, we have improved... the air is already a bit cleaner... plantations; the trees have improved the environment... before there were disgusting odours, now there is plenty of vegetation, those sandy pampas are green, as you can see..."*. Therefore, with 18 treatment pools working and its use for agricultural crops, parasites presence has decreased, contributing to the improvement of the community's life quality and the environment; likewise to the prevention on the transmission of diseases.

As a result, treated waters used at present to irrigate agricultural San José farmers' community are contributing to decrease diseases and environmental sanitation. This contaminating situation has been transformed on an ecological, cultural, social and economic value. For example, the hectare of land has appreciated, now costing 500 \$/Ha.

The priority for the construction of biological oxidation ponds, concentrated the attention on the water infrastructure enforcement only, leaving aside an integral proposal involving education and health as part of agricultural development with an agroecological approach. On the way, ecological production has been specified and enforced, but with difficulties for the lacking of long term research/capacity building programs. The subject of education and health has been solved by the farmers, articulating to urban markets. As much as the farmers are contributing to a healthy environment of surrounding cities, improving San José and Pimentel beaches (which is facilitating the extension of the Pimentel pier, with touristic houses building), a collective environmental consciousness of urban citizens, valuing it as a regional/touristic heritage of Lambayeque Region, is lacking. This farmer's contribution is not valued by either local or regional society. For this reason, it is important to create a consciousness of regional identity and cultural/touristic heritage, and to develop environmental awareness and education. Similarly, left standing is the integrated vision of water resource management at Chancay-Lambayeque watershed, including as part of the process, both clean water and treated wastewater as part of an integrated space, where diverse actors in favour of development, act.

A working line is the impact of the action on local, regional and national policies; institutional capacities are being strengthened at the community level to guarantee the sustainability of the action. However, the State presence as organiser of water resource is null still. With active involvement of farmers' community, we could think on a management model on community's hands that is giving good results, but its limitation is on its articulation at the level of Chancay-

Lambayeque watershed. Water policies go around regulated water by Tinajones reservoir, but its management is disintegrated from the interests of diverse actors located at the watershed, from origin to completion.

5. LESSONS LEARNED.

a) The use of city wastewater is outside the local and regional government policies; its reuse is not a common practice. Nevertheless, they are potential water resources for agricultural development, in an area with water scarcity for irrigation. Its growing use, under the organisation and management of smallholders and farmer communities, could become a strategy for new projects on recovery and reuse of wastewater; besides being instruments of environmental sanitation and poverty mitigation. The advantage is that these waters increase with urban population growth; they are reliable waters for farmers and its volume does not depend on rainfall and the regional water balance. Hence, the possibilities for its expansion and sustainability depend on inclusive public policies, with watershed approach, under the management of small farmers' agricultural organisations.

b) Cooperation is an important instrument for development because there is a learning process on how to negotiate among diverse actors. The rationalization of human and financial resources leads to a better and larger attention to users; cooperation legitimates and strengthens institutions; institutional image grows. It is shown by the farmer's practice of San José community.

c) Agricultural organisations involvement is fundamental when proposals are supported by its individual and collective interests; the strategic vision is to establish inclusion channels that allow developing its negotiation and leadership capacity. In this framework, the users' intervention on water distribution is important for water resources management to be efficient. When an action is directly related to participants' interests, the rules established facilitate the functioning of the social group. Not only is gained in efficiency on water resource management but also an integral and systemic vision of natural resources is guaranteed, on a specific territory.

d) The social, economic and environmental impacts produced by the organised management and the efficient use of treated waters by farmers, shows a rural alternative of small production in their hands. A public policy linked to farmers' practices could facilitate the inclusion of that wastewater to agriculture, without the requirement of large treatment systems; its enforcement is possible by collecting innovative experiences from farmers, with artisanal treatment practices. It would be a social inclusion policy with more effectiveness in its sustainability.