Reuso

SUSTAINABLE SANITATION, ECOLOGICAL SOLUTIONS

Specializing in Sanitation Magazine • year 1 • N° 2 • La Paz, Bolivia

ENTREPRENEUR Youngsters in Decentralized Sustainable Sanitation

Ecological Sanitation, a NEW OPTION

Interview To RON SAWYER SARAR - Mexico

Benefits from e-learning

OUR **COVER**

Photography: Family sanitation organic garden module, grown with gray water treated (District 1 from Montero municipality - Santa Cruz).

Reuss

SUSTAINABLE SANITATION, ECOLOGICAL SOLUTIONS

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Project: Decentralized Sustainable Sanitation NODE as a Knowledge and Impact Generation Platform in Sustainable Solutions

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NODO DE CONOCIMIENTO EN SANEAMIENTO SOSTENIBLE DESCENTRALIZADO

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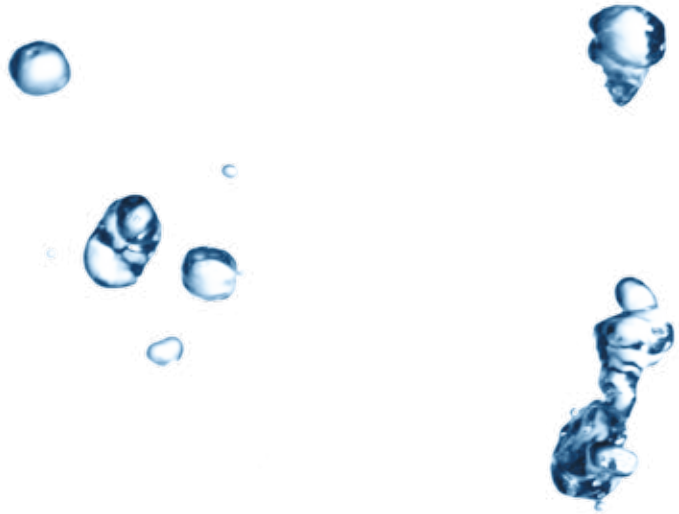
CONTENIDO



EDITORIAL

Promotion and dissemination of Decentralized Sustainable Sanitation represent a strategic line of knowledge management of "Decentralized Sustainable Sanitation NODE Project as a Knowledge and Impact Generation of Sustainable Solutions Platform", implemented under a strong conviction to socialize experiences, share updated information and disseminate Ecological Sanitation values.

Through this second issue of **Reusso** Magazine we intend to share interviews and articles related with relevant aspects positioning Ecological Sanitation as a determinant and truthful solution, offering analysis on the social operational approach on sanitation; regarding challenges related to the new to move forward regulations of ecological systems, as well as over case studies in the field of research and developed experiences over the wastewater treatment for fast-growth urban areas.

Reusso also includes the history of projects related to the development of knowledge in the field of entrepreneur youngsters, encouraged by social and ecological principles, and finance potential of such technologies.

Another important objective is to spread also Decentralized Sustainable Sanitation advantages in spheres of public local agenda, covering then the main aspects related with services operator and with municipal planning as a management tool to implement and achieve water and sanitation services policies.

Similarly, we continue with synergies in the field of academics, since through research and students learning, it is possible to enlarge innovation spaces, knowledge generation as a truthful base and sustainable in time.

SNV/NODO invites you, dear reader, to enjoy the second issue of Reusso Magazine, a biannual space intended to specialized information and analysis. Also we thank the valuable support from interviewed and collaborators.

Jorge Julio Garrett Kent

SNV BOLIVIA COUNTRY DIRECTOR

Ecological Dry Bath , COSMOL Montero

INTEVIEW TO RON SAWYER

SARAR TRANSFORMATION EXECUTIVE DIRECTOR (MEXICO)

DECENTRALIZED SUSTAINABLE SANITATION REQUIRES COMMITMENT FROM GOVERNMENT, ACADEMIC AND SOCIAL LEVEL

Interviewed by Brenda Pardo
REUSSO – SNV magazine editor

Ron Sawyer has over 30 years of experience providing technical support and training to water and sanitation programs in Latin America, Africa and Asia. He is one of the participative methodology SARAR/PHAST creators and is being 15 years working in the promotion of Ecological Sanitation. He is founder member of Freshwater Action Network Mexico.

1. What is the current status of Ecological Sanitation in relation to its start?

Looking back at least a couple of decades ago, progress in the subsector of "Ecological Sanitation" have been impressive. The main pioneering the concept of dry sanitation was a Swedish, Uno Winblad, who since the 70s was co-author of a book entitled "Sanitation without water", who compiled and described various schemes of dry latrines and toilets, including the Vietnamese system of dry toilets with urine diversion, which are well known in Bolivia

This event was important because the idea of waterless sanitation was foreign for urban people who only knew the water sanitation.

Then, in mid 90s, Winblad was hired by the Swedish International Development Agency (SIDA) and returned to the idea of investigating and documenting experiences with different types of "dry toilets", and I was privileged to be a member of the group of specialists and co-author of the book entitled Ecological Sanita-

tion (first edition 1998; second edition 2004), as it announced different types of toilets quite evolved that do not pollute and do not waste water.

Just like this process, driven by the Swedish Agency, GTZ of Germany, Eawag-Sandec of Switzerland and WASTE from Netherlands were simultaneously working in the field of "alternative" sanitation. GTZ for instance, worked with biogas experiences in Santa Cruz.

Then, in 1999, an international workshop was held in Cuernavaca, Mexico, gathering professionals in the fields of alternative sanitation, public health, nutrition and agriculture to exploit the approach of Ecological Sanitation, since it is not just important not to pollute, but also recognize that sanitation can be an important resource for a sustainable agriculture and, thus ensuring food security. This experience was compiled in the publication *Closing the Loop: Ecological Sanitation for Food Security (UNDP, SIDA 2000).*

Later comes the SuSanA network *(Sustainable Sanitation Alliance)* in order to promote better experiences in sustainable sanitation systematization interchange in several places and regions around the world.

When the Decentralized Sustainable Sanitation Node (DSSN) began in Bolivia (2008), the proposed name, allowed integrating the concept of dry sanitation with wet sanitation such as Decentralized Wastewater Treatment Plants (D-WWTPs) which promotes AGUATUYA. Then an evolution from SanSeco, ECOSAN came, Sustainable Sanitation and Decentralized Sustainable Sanitation.

> *"Sanitation can be an important resource for a sustainable agriculture and, thus ensuring food security."*

We must concentrate on decentralized systems since they allow long-term sustainability.

2. What are the main strengths of Ecological Sanitation?

Benefits of Ecological Sanitation are numerous. They are systems which care greatly the environment, preventing pollution and protecting the limited resource, that is, they do not waste water, do not waste nutrients and thus close the cycles to complement sustainable agriculture, in order to ensure food security, as this is a key issue for Ecological Sanitation.

Also, decentralized systems enlist to ownership and management at Community level (users), because they do not depend on complex and sophisticated technologies and high operating costs which often exceed the capabilities of communities and municipalities themselves compared to conventional systems. At least in Mexico up to 70% of conventional Plants - for instance activated sludge - are abandoned by the lack of technical knowledge, but also because the municipalities lack the financial resources for energy expenditure

So we must go for decentralized systems because they allow long-term sustainability.

Ecological dry toilet, Sumaj HUasi Foundation

It means that the Ecological Sanitation presents an option that may be viable as long as they are contextualized and users have the knowledge. Therefore it is essential to highlight the social and educational as well as technical aspects, to ensure the sustainability of long-term services.

3. From your perspective, how is Ecological Sanitation in Bolivia and what the challenges are to be faced?

Bolivia's experience, although not highly well known in the region or worldwide, it is outstanding because there is a long history of alternative sanitation systems.

Experience with urine diversion toilets with Mennonites came in the plains of Santa Cruz in the late 80, that is, it is not a new experience. UNICEF subsequently also featured a program of rural dry toilets for a long time; and there were other experiments with various organizations such as PAHO (Pan American Health Organization), GTZ, and various NGOs.

But today, thanks especially to the promotion and support of Sweden through EcoSanRes/SEI Project, among training, technical support and funding, it has been able to help several important initiatives. It is also remarkable to mention recent Node partners DSSN

- Sumaj Huasi Foundation implemented over 4,000 ecological toilets in El Alto city, integrated systems with gray water treatment, but they also achieved logistics support and collection products from dry toilets to treat and apply them in the field. This is a demonstration project with a large scale in Latin America.
- Another important job is the one performed by Water For People in Cochabamba and in Santa Cruz smaller scale with an approach that covers important microfinance schemes, systems of collection, processing and closing cycle over the social work with families and their communities.
- The third NODE's partner is AGUATUYA, with a different approach, but not least, is working with STP-D Wastewater treatment in small plants, which is an option for places that have the right conditions including enough water to flush toilets.

With such examples, Bolivia has infinite enriching jobs that can be systematized and disseminated, without leaving aside

other organizations working in the same thematic and of course universities. The NODE has linked this objective with the University San Francisco Xavier de Chuquisaca - and in smaller degree with other universities -, where they had the opportunity to generate new knowledge and share them.

Although the ecological sanitation in Bolivia is already a well-known option at government levels, both national and departmental, among defiance and challenges is still the need to influence more on public policy and integrate the municipal level.

Rather, it is a matter handled by NGOs with external donors and even if the SENASBA has been supporting through the DESCOM program (Community Development), it requires greater force.

WWTP Cliza - AGUATUYA

4. In your opinion what is needed in Bolivia so that Sustainable Sanitation conditions are met?

There are the elements in Bolivia but there must be greater planning capacity at municipal and watershed level.

One of the great weaknesses both in Bolivia and other countries of the region is the lack of planning and integral multisector programming to contextualize solutions to the needs of the diverse neighborhoods and areas or zones of the country. It has to assume greater commitment and resource mobilization at the government level with strong involvement of civil society and universities, emphasizing the educational and social side.

Also the human right to access to water and Sustainable Sanitation must extend in rural as urban areas.

(TTC) Sumaj Huasi Foundation

SECONDARY TREATMENT OF FECAL WASTE FROM COMPOSTING TOILETS THROUGH INNOVATIVE METHODOLOGIES

Raúl Silveti C.
NODE-SNV Project consultant

In the last 20 years, several projects with alternative technologies of Decentralized Sanitation (composting toilets) have been developed in Bolivia; for this sanitation option the last step is to close the nutrient cycle, namely nutrients and minerals, resulting from final treatment of organic waste (feces and urine), return to nature and can be reused safely. But it has two problems encountered in the process of closing of Ecological cycle from dry component (human feces):

- Ensure biological and health safety of organic fertilizers produced.

TTC) Sumaj Huasi Foundation

› Submit a product suitable for marketing with sanitation guarantee.

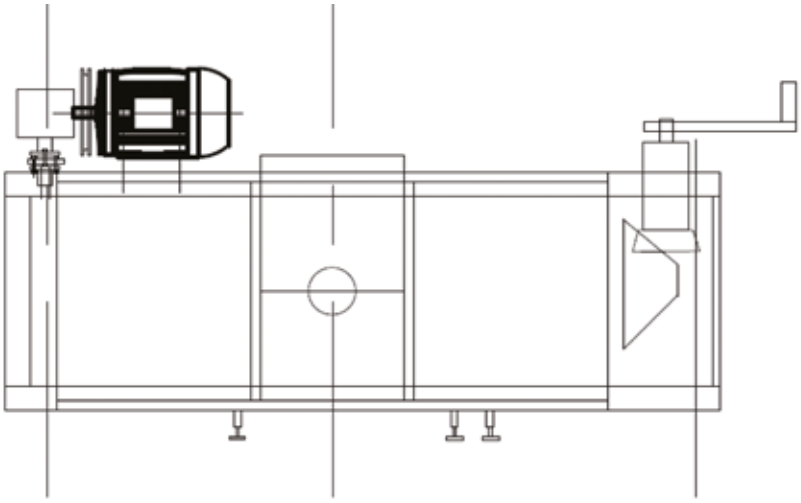
Composted human feces, either in simple burial processes or worm composting, may give the appearance of being a safe product despite degradation treatment of organic matter which is subjected, but are potentially pathogenic[1], this is the main reason that makes necessary to introduce a Secondary Treatment Final Stage (STFS), ensuring biological safety (eg. pasteurization of the product) and improve the appearance of the final product for commercialization (eg. in the form of pellets)

In the last two years, in various parts of the world, especially in South Africa, they have been developed and tested successfully innovative technologies appropriate to solve these two problems

Validation research

Validation research of these new technologies is aimed at resolving the final process of composting organic waste from composting toilets (Biosolids SanEco) and thus ensures the closure of the ecological cycle through the use of organic fertilizers produced safely. Solutions to these problems are sought through the validation of new technologies developed, were framed in economic sustainability possibilities of the sustainable sanitation model developed in Bolivia, which largely depends on marketing possibilities for organic fertilizers produced with sanitary safety guaranteed and the final presentation of product with competitiveness opportunities in the current fertilizer market, especially for the cost, quality as recovery of soil and quantity of micronutrients.

1 Recommendations of final study Phillip Collander, Emory University, 2013.



"BRAMA company, based on the basic design developed in 2012 by Sumaj Huasi Foundation, has built the machine, and will be installed at the Technology Transfer Center (TTC) in the city of El Alto."

TTC) Sumaj Huasi Foundation

TTC) Sumaj Huasi Foundation

Rationale

African Conference on Sustainable Sanitation in Durban, South Africa in August 2012, engineers John Harrison and Dave Wilson from "eThekwini Water and Sanitation"[2] company presented the development of machine called LaDePa (Dehydration Latrine and Pasteurization) which produces hygienic and safe organic fertilizer. The approach to validate these new technologies is based on replicating successful experiences of this machine.

"eThekwini Water and Sanitation" (EWS) and the municipal entity responsible for providing sanitation services to Durban and surroundings, have co-invented and tested this technology in portable containers with low-cost called LaDePa because they can convert medical waste from well latrines and septic sludge (as bio solids from dry composting toilets) in a (sanitary harmless), pelletized, pasteurized, dry, usable product and of great benefit to farmers. They have shown that LaDePa technology is financially viable in the treatment of more than 2,000 tons of sewage sludge per year.

> *"Composted human feces, whether in simple burial processes or composting with worms, they can give the appearance of being a safe product despite the degradation treatment of organic matter which is subjected."*

2 John Harrison and Dave Wilson eThekwini Water and Sanitation, P.O.Box 1038 Durban, 4000.

This technology was validated and developed within the framework of the technical assistance of NODE-SNV, aimed at strengthening capacities of strategic partners to implement final treatment plants for organic and safe waste and management of Decentralized Sustainable Sanitation solutions Decentralized (SSD), in the perspective of creating and institutionalizing public policies favorable to its scalability.

Building a pasteurizing machine model LaDePa (laboratory scale) for the production of pasteurized pellets

Based on the documents published by the engineers John Harrison and Dave Wilson, this technology will be validated and developed, so we have designed and built a prototype (laboratory scale) for the production of pellets, starting from the compost of organic waste of dry toilets produced in El Alto (Sumaj Huasi) Riberalta (Water for People) and Santa Cruz (Water for People: a prototype model has been built by the company).

TTC) Sumaj Huasi Foundation

TTC) Sumaj Huasi Foundation

TTC) Sumaj Huasi Foundation

BRAMA (Calculus, Design and Mechanical Construction from El Alto city), based on the basic design developed in 2012 by the Sumaj Huasi Foundation has been built the machine and it will be installed at the Center for Technology Transfer (TTC) in the city of El Alto. To date we have conducted performance tests, handling of organic waste and production of pasteurized pellet* in coordination with the staff of TTC.

Technical specifications of experimental model

- Dimensions of the conveyor belt: 1.5 m long, 0.5 m wide and 0.3 m high.
- Conveyor belt built in folded carbon steel plate of 2 mm thick, 200 mm high type C, with side edges 50 mm wide.
- Motor-driven drums by braided mesh in galvanized wire, with fixed supports and tesador built in steel plate of carbon.
- Return Polines built in tubes galvanized
- Gear motor drive system with 1.5 HP single-phase 220 v.
- Heating chamber built in of carbon steel plate, with atmospheric gas, manually controlled burners reaches temperatures of 0-500 ° C.
- Support structure covered with anti-corrosive paint.

* Pellet is a generic term used to refer to small portions of agglomerated or compressed material.

CURIOUS FACTS

What is intended through the concept of Decentralized Sustainable Sanitation is offer an alternative to conventional forms of sanitation, to improve the living conditions of the population living without these services.

For its effective implementation, Decentralized Sustainable Sanitation needs to be positioned as an option for improvement of the population living conditions, this means achieving social and conceptual change in vision of sanitation as a new paradigm.

Project youngsters entrepreneurs for the implementation of Decentralized Sanitation solutions, financed by the Fund for Urban Youth UN HABITAT, was founded with the aim of encouraging young people to develop and pursue ideas in the area of Decentralized Sustainable Sanitation.

Since 2010, Bolivia launched a crusade to make the United Nations to declare water and sanitation as human rights.

Sanitation, in general, requires an individualized approach with specific guidance needs strategic and social efforts as well as a deep level of community commitment.

The autonomous regulatory framework and the competences established by the SC, the Autonomy and Decentralization Framework Law and the laws in force of Environment (1992) and Provision of Water and Sewerage Services (2000), support and facilitate the provision of the exercise of powers and public investment in the different levels of government and concurrently between these levels for the water and sanitation sector and fulfilling the mandate of Human Development to Water and Sanitation.

Ecological dry toilet COSMOL Montero

GUIDELINES FOR A SOCIAL OPERATIONAL APPROACH

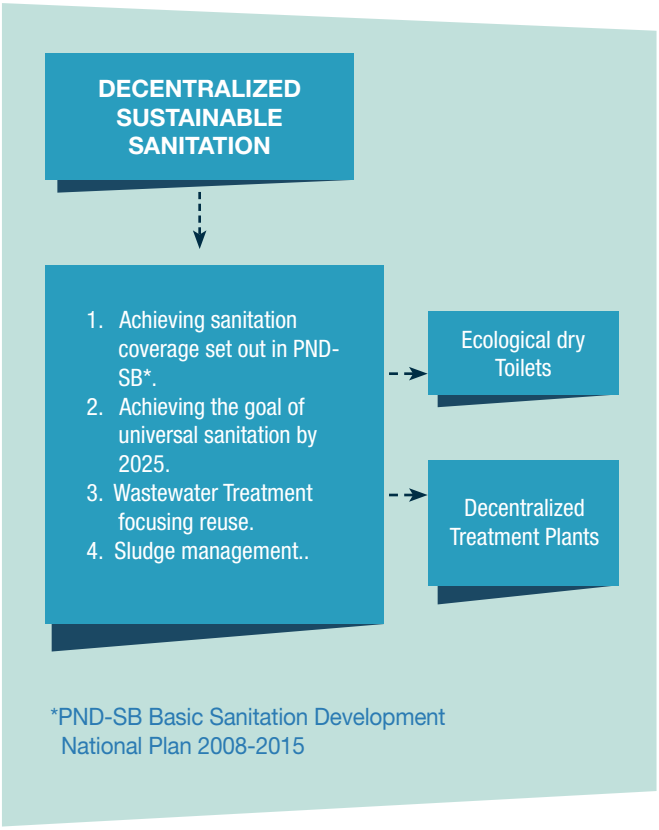
IN DECENTRALIZED SUSTAINABLE SANITATION

Mónica Ayala S.
NODE-SNV Project consultant

Since 2010, Bolivia launched a crusade to make the United Nations declare water and sanitation as human rights.

Considering the challenge of universality in coverage (100% in water and sanitation) stated in the Patriotic Agenda 2025, investment and promotion of sanitation systems with a vision of sustainability and decentralization constitute an effective option.

Decentralized Sustainable Sanitation (SSD) is a new philosophy, a new approach to sustainable management of organic resources and water, through which prevents diseases,



supports conservation and environmental protection and nutrients are recovered and reused. The prospects for sustainability and decentralization are the basis of a participatory vision, ownership and also accessible to the most vulnerable strata of the population.

Decentralized Sustainable Sanitation Prospect

Sanitation, in general, requires an individualized approach to specific guidance; also needs strategic, social efforts and a deep level of community involvement. When speaking of sanitation referring to the prospect of a service whose benefits are not as tangible as water service, hence solutions in situ (latrines, ditches and open defecation) compete effectively with any option of improved sanitation (septic tanks, composting toilets, etc.).

What is intended through the concept of decentralized sustainable sanitation is to provide an alternative to the conventional forms of sanitation, to improve the living conditions of the population living without these services.

It aims to meet the demands of coverage and service quality and contribute to reach the goals of Agenda 2025, through ecological systems with high contribution to the environment.

The SSD technology interventions are targeted to services Decentralized Wastewater Treatment Plants (D-WWTP) and Ecological Dry Toilets (EDT).

It is necessary to consider sanitation as a social, technical and regulatory concept.

Guidelines for a social operational approach in Decentralized Sustainable Sanitation

The concept of DSS is a new paradigm of sanitation; by its nature requires a holistic social approach rather than a purely technical concept and involves an intensive social work also allows establishing closer contact and more direct involvement of the beneficiary population

This participation integrates from planning, implementation and management of wastewater treatment and reuse of treated water, to boost ownership and self-management of both services.

As a new paradigm, Decentralized Sustainable Sanitation is a process that should consolidate and seating management, implementation and operation of the systems on stakeholders and institutions, especially contribute to the development of actions and processes for raising awareness, ownership, responsibility, definition of roles and commitments to largely determine the viability and technical, social, environmental, institutional, administrative and financial sustainability of these systems.

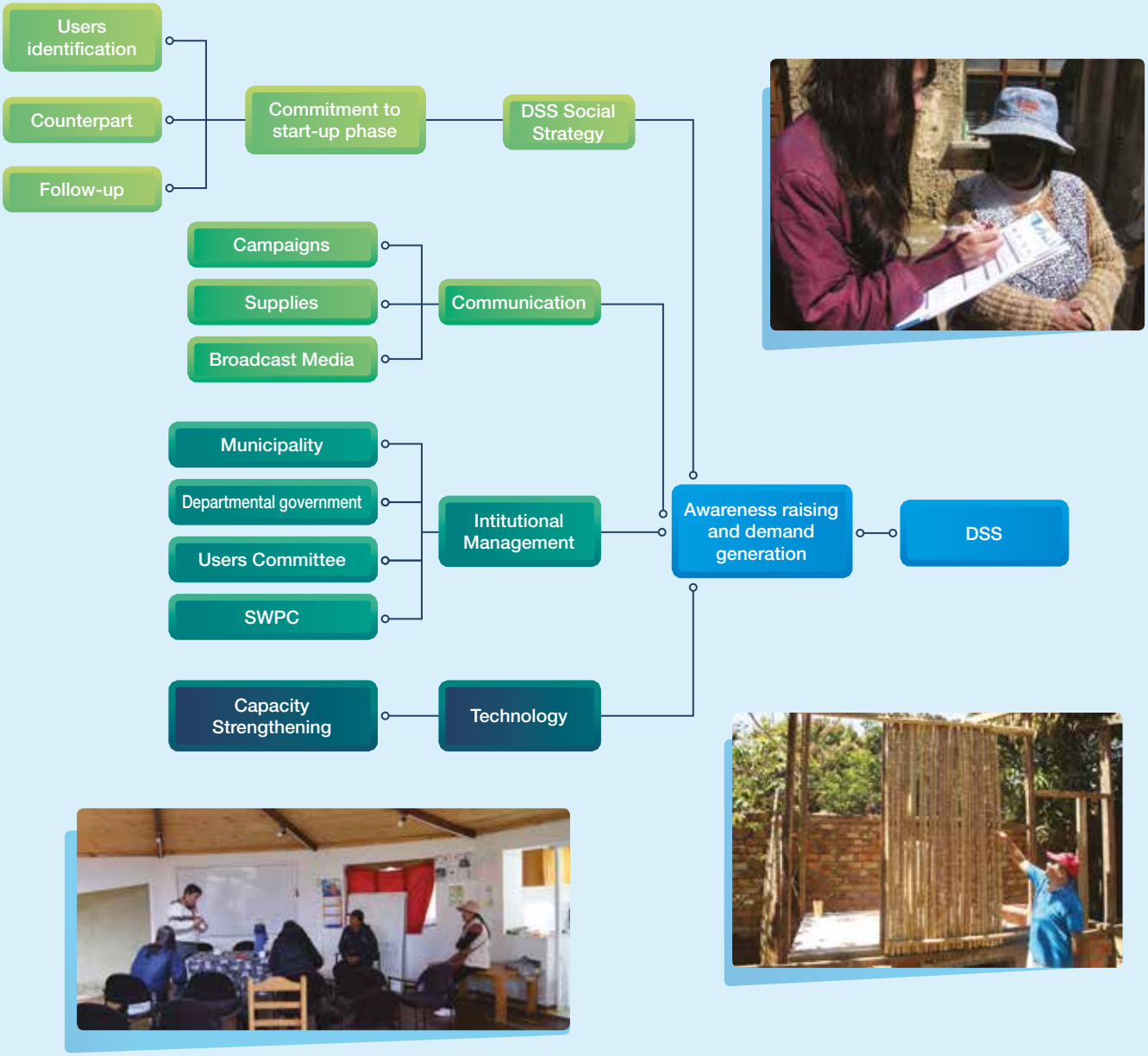
Social implications of Decentralized Sustainable Sanitation components

For effective implementation, Decentralized Sustainable Sanitation needs to be positioned as an option for improving the living conditions of the population that means achieving social and conceptual change in vision of sanitation as a new paradigm. Such challenge requires an operational and social approach that starts from the vision of its four components (demand generation, and technology and construction, operational social and institutional management and reuse of organic resources) from an adapted perspective to their specific requirements.

Each DSS component has specific social implications gravitating not only on the same component, but also projects previous actions to address the other three components from the perspective of social operation simultaneous and no sequential.

Ecological Dry Toilets, COSMOL Montero

Component: Raising awareness and demand generation

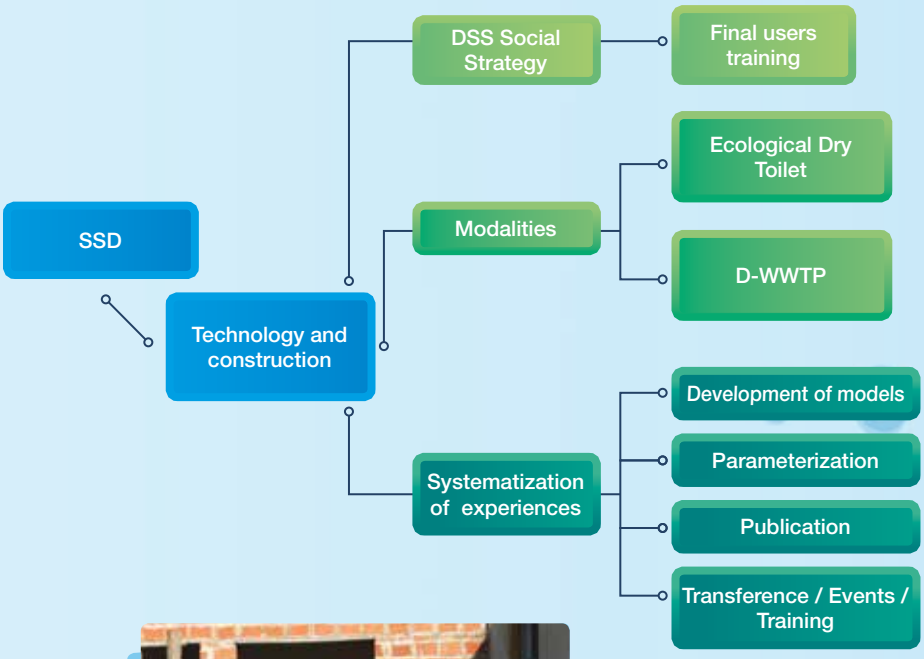


This is how the component of *awareness and demand generation*, besides establishing the foundations of the process and sustainability of sanitation services through information and training stakeholders, it also should set appropriate and consensual technology with the population (technology and construction), besides establishing the roles and responsibilities of each actor for generating gatherings and sustainability **(operational, social and institutional management)**. It also identifies preliminarily the potential and interest for reuse of treated water and/or destination of compost derived from the organic resources of Ecological Dry Toilets.

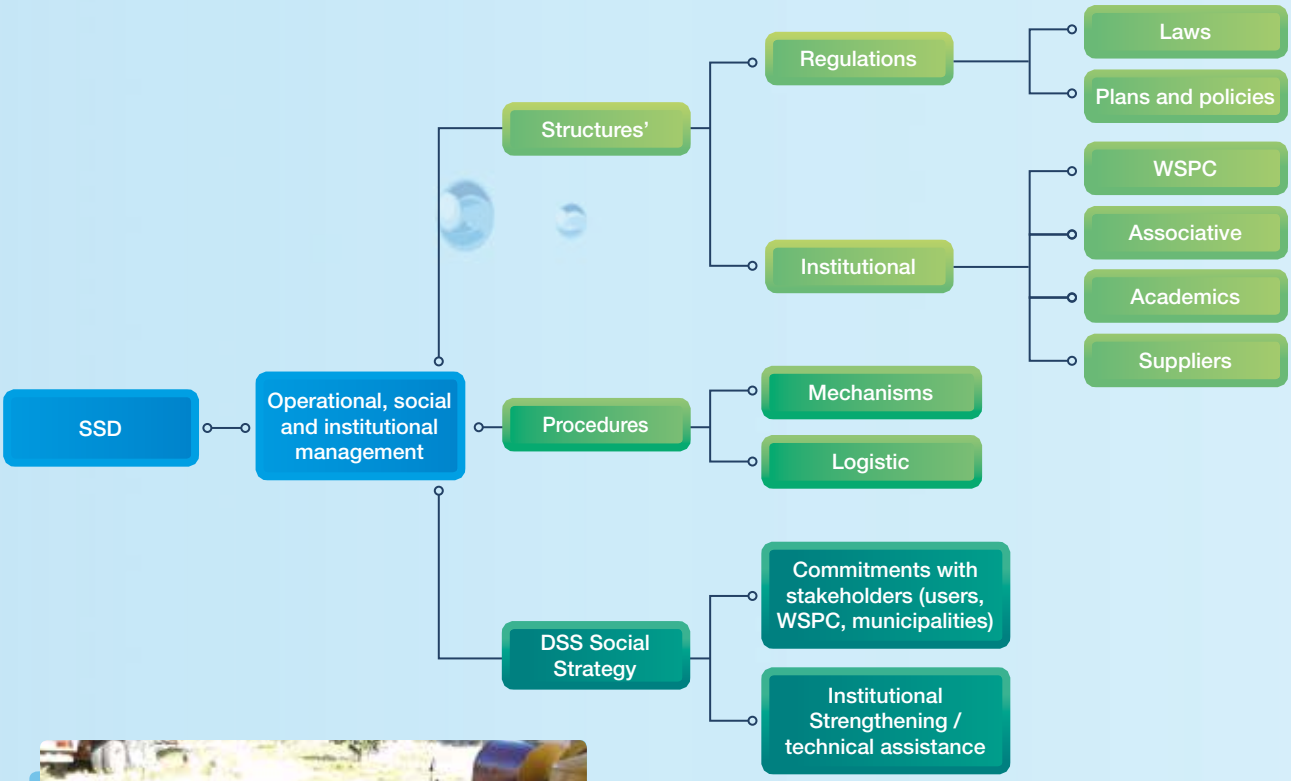
Therefore, in this way one can see the simultaneity of social operation on each of the components of the Decentralized Sustainable Sanitation approach.

Decentralized Sustainable Sanitation is a new approach for the sustainable management of human waste and water, with which diseases are prevented, it supports the conservation and protection of the environment and nutrients are recovered and reused.

Component: Technology and Construction



Component: Operational, Social and Institutional Management

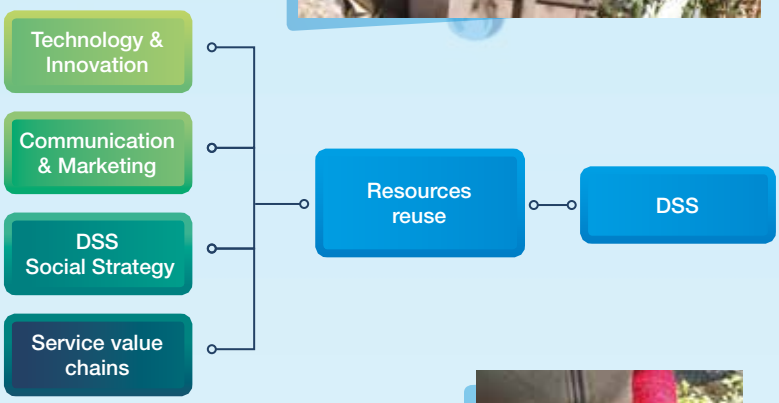


Decentralized Sustainable Sanitation systems face two challenges for its positioning on the user priorities: first, the change of system disposal of excreta, and the other the commitment to maintenance and operation.

Interventions made within the framework of NODE Project, in terms of Dry Ecological Toilets and implementation of Wastewater Treatment Plants, have demonstrated the need to visualize the four components of the DSS perspective almost simultaneously and not sequentially.

To consider the outlines of a social operating system approach which Decentralized Sustainable Sanitation applies in its projects and interventions, It is necessary at first to pose sanitation as social, technical and normative concept, in a vision that aims to abstracted from the concept central water, directing DESCOM to specificity required in the DSS perspective.

Component: Reuse of Organic Resources



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BENEFITS

Cristian Cadena L.
NODE-SNV Consultant

Distance education, despite being a relatively new concept that is gaining much strength today has its origins long time ago.

Its history goes back to ancient Greece to the epistolography (letter writing) many of these letters were used for an educational purpose. The next name acquired by distance learning was "education by correspondence", the first documented experiment was carried out in 1828, when the Boston Gazette, Professor Philipps offered teaching material and tutoring by mail. In 1840, Isaac Pitman, developed a system of teaching shorthand by correspondence, it was based on sending cards and receipt of the students exercises for correction.

In 1843, the "Phonographic Correspondence Society" was founded in England, considered the first "normed" remotely training institution. In 1962, in Spain, the first radio experience developed the first experience of remote radio

"Currently, within the virtual platform of SNV Node of Decentralized Sustainable Sanitation there is an e-learning system online and fully operating."

OF E-LEARNING

of high school was developed with the support from Engineers free School of Valencia (Spain). In 1972, just one year after the creation of the British Open University, the National University Distance Education was created (UNED) (Spain). It is currently one of the largest distance education centers in the world.

The next big step of this method is the CAL (Computer assisted learning), this was the basis of e-learning as we know it now. Some important historical milestones are also listed below:

PLATO (Programmed Logic for Automated Teaching Operations), developed by the University of Illinois in 1960 (the system was developed for the United States Armed Forces). In 1969 the first computer network connecting 4 computers, reaching with the ARPANET project (Advanced Research Projects Agency Network) to 213 computers connected in 1981; in 1989 the HTML language was created being the most used on the web (language used to date). A year later (1990) the first Web client is created, called World- wideweb (it is here where the famous "www") were born and the first web server, with this Internet age had begun.

With the progress of technologies and Internet applications created for new tools that empower learning they were generated using this method.

It may be noted that the most significant ability to develop the design and management of online courses is the generation capacity of multimedia material that is instructive and not boring. Solid pedagogical concepts need to be handled to take advantage of multimedia content (audio and video) and thus make "fun" learning.

Another important feature to consider is the interaction with the tool or set of tools to be used for a virtual course. As in this mode there is no longer the teacher-student physical relationship, it is extremely important to create a space for interaction between students, teachers, administrators and managers of virtual courses.

As can be observed, two other actors in this mode, administrators and managers were created. Both categories are of utmost importance to develop a virtual course efficiently, since is necessary to take into account that in this mode one may have rooms with far more participants than classroom training rooms.

For an online course (in logistics) work perfectly, great synergy is needed among these four types of stakeholders. a key in this respect is coordinating and team work.

A major advantage of this modality is to use our learning time autonomously; it means that is not necessary to be present at a certain time in a virtual education platform (as is done in the classroom training) on the contrary, the time spent for learning and interaction with the actors in the virtual course is defined by ourselves

A major advantage of this modality is to use our learning time autonomously; it means that is not necessary to be present at a certain time in a virtual education platform

One of the most used tools for virtual training in the world to date is Moodle created in 2001. This is an online training system open source (anyone can modify the system at will).

This tool, plus the addition of other virtual resources used ingeniously and mainly collaborative, allow the proper functioning of robust virtual education platforms and attractive for end users.

Currently, within the SNV Node of Decentralized Sustainable Sanitation virtual platform there is an e-learning system online with all the features mentioned above and fully operational. The area of virtual training of Node platform has the Moodle system in version 2.0.1.0, virtual web room in air's (webinars in real time) with a maximum of 100 people connected in real time, a video channel aimed to distributing video presentations, video tutorials and educational videos, a mailing system (email communication) that enables secure communication with participants of an online course, plenty of space for file storage users to download and mainly a team committed and motivated to provide the best support the needs of our users

EFFECTIVE TREATMENT OF WASTEWATER

OF RAPID GROWTH URBAN AREAS

Renato Montoya P.
Planning Coordinator
AguaTuya Foundation

In most Latin American countries, the fresh waters are polluted by the activities of the human being and, as a solution to the problem is sought, the receiving bodies continue polluting and deteriorating.

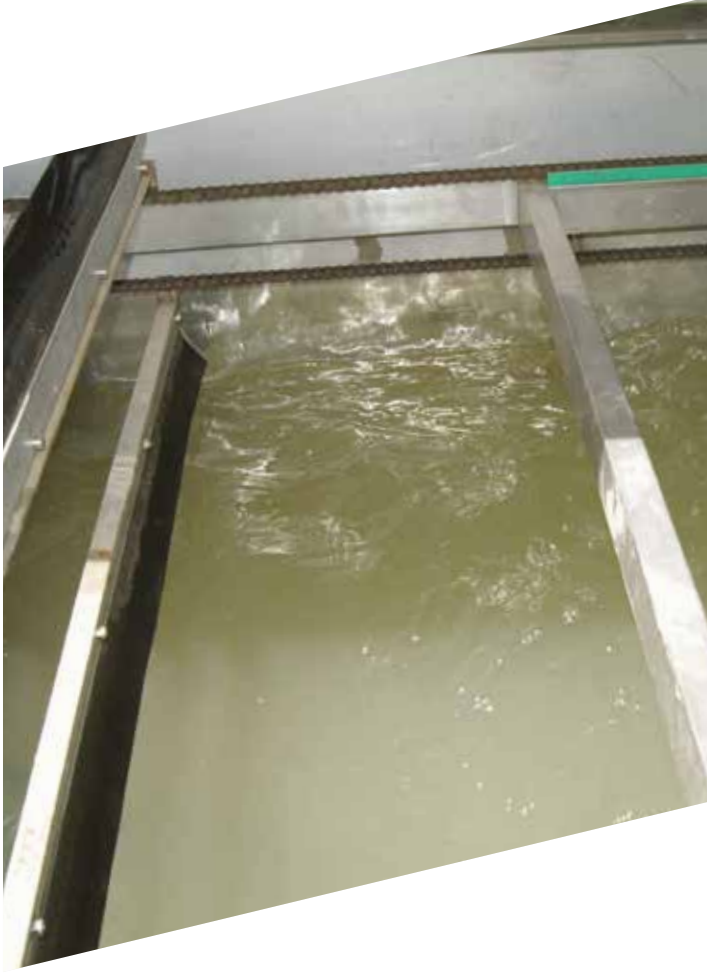
Bolivia and Cochabamba in particular are not spared from this; in the metropolitan axis of Cochabamba, where 7 municipalities coexist, whose population concentrates 60% of the department, are polluting Rio Rocha by domestic wastewater discharges numerous urbanizations located along the 40 km of its course, in turn, these waters are used for irrigation of agricultural products without any treatment, undermining the health of the population. In short, we have a poor wastewater management.

According to our experience, the solution to this problem is linked to a paradigm shift and proper planning of basic services by local development entities.

Planning of Basic services

The accelerated urban growth in recent years has resulted in human settlements in areas of urban expansion with no basic services, since neither the municipal entity or traditional planning have been able to meet the needs of this population, that every day is growing rapidly; so that as the city grows it has less coverage of sewerage services, less coverage in wastewater treatment and most of the residual water is used without any treatment for irrigation and even vegetables, soils and aquifers are specially contaminated in areas where there are no sewage networks.

Therefore, urban planning of the city should be consistent with the planning of basic services in areas of urban expansion where the population grows rapidly, and above all, taking into account population growth as an opportunity rather than a problem.



By this, we mean that planning should consider a paradigm shift from centralized sanitation systems to decentralized sanitation systems; conceiving that as the city grows, Wastewater Treatment Modular Plants should be built, versus what has been done, having a single treatment plant for the entire city, this decision will take us to have an efficient wastewater management.

> *"Urban planning of the city should be consistent with the planning of basic services in areas of urban expansion where the population grows rapidly."*

Advantages and disadvantages of these systems are:

Parameter	Centralized System	Decentralized System
Sanitary sewers, collectors and collection networks	Large diameters Long distances	Lower diameters Shorter distances
Treatment Technologies	Basics avoiding large investments	More and better technologies options with low costs
Required space	Large area in a single place	Smaller areas in several places
Operation and maintenance	Full time technical team	Less demand for staff
Supplies and energy	High consumption of supplies and energy	Low consumption of energy and no supplies
Water uniformity	Many types of water	Greater uniformity
Grade of dilution	Less control over rainwater, greater dilution	Greater control
Nutrients	Loss of nutrients: nitrogen, phosphorus and potassium.	Recovery of nutrients nitrogen, phosphorus and potassium for agricultural purposes
Social control	Social control is lost	Greater social control
Environmental risk	Larger scale risk	Distributed risk
Facility of increasing its capacity	High costs	Lower costs modularly constructed
Reuse of treated water	Treated water is located at a single point	The water is treated at several points and can be reused locally (in a neighborhood, in a district)

Source: AGUATUYA, 2013

"For effective management of wastewater there must be concerted and planned actions from the stakeholders of sector and ensure that they have the resources necessary to fulfill ownership, operation and maintenance and support functions, based on an acceptable rate for the population."

In the metropolitan axis of Cochabamba, where 7 municipalities coexist, whose population concentrates 60% of the department, Rio Rocha is being polluted by domestic wastewater discharges.

A new approach to Wastewater Treatment Plant

Currently the idea of the population on a Wastewater Treatment Plant (WWTP) is that contaminates, produces odors and is harmful to the health of the population. The purpose is to change the paradigm of unsustainable to sustainable WWTP with a very different approach to the one given so far. The following table shows the characteristics of each one:

Impact	Unsustainable WWTP	Sustainable WWTP
Health	Threatens the health of the population	Protects the health of the population
Environment	Contaminates environment	Cares and does not contaminates the environment
Economic development	Does not provide any benefit to the population	It is a tool for local development and benefits the population. Treated water can be reused for irrigation of agricultural products
Operation and maintenance	Produces odors	It does not produce odors and is efficiently operated based on a fee

Source: AGUATUYA, 2014

Technology

The choice of WWTP technology should be appropriate to the local context because otherwise it may lead to failure. We have examples in Bolivia of many plants which have been built and never put into operation or they worked for a short time, because I knew there was no staff to operate and maintain, that is, the system proved to be unsustainable. The choice of technology must take into account the following points:

- Define stages according to the level of treatment according to the crop to be watered.
- Check if you have the space available. Have low power consumption. It should be easy to operate and maintain.

Technology Transference Centre ; Sumaj Huas Foundation

Sustainability

Sustainability of treatment plants is based on three important aspects:

- The rate that beneficiaries are willing to pay: this should take into account administrative, operation and maintenance and replacement of the WWTP costs.
- The reuse of treated water: check whether community members close to the WWTP are willing to pay for the reuse of treated water for irrigation.
- The operational management model adopted for the WWTP should clearly define the three basic functions:

We conclude that to achieve **effective management of wastewater** there must be concerted and planned actions from the sector stakeholders and ensure that they have the necessary resources to fulfill the functions of ownership, operation and maintenance and support, based on an acceptable rate for the population.

WWTP: Ciza Municipality, AGUATUYA Foundation

ENTREPRENEUR YOUNGSTERS IN DECENTRALIZED SUSTAINABLE SANITATION

According to the UN, youngsters aged 15 to 24 years old represent 18% of total world population, and are a determining factor in social change, economic development and technical progress. That is why it's important to take into account their initiatives, energy, prospects and hopes for the development of societies.

Gabriela Mariaca R
NODE-SNV Consultant

> *The Project has trained about 120 youngsters from the cities of La Paz, Santa Cruz and Chuquisaca in the implementation of Decentralized Sustainable Sanitation projects, with emphasis on ecological toilets.*

Circumstances and actions leading to overall inequality in Latin America come first during youth. **For example, child school enrollment** in Latin America and the Caribbean is almost universal, enrollment in secondary education is far from being universal, especially for the poorest. Also, delinquency affects the most vulnerable in society and although the factors behind these differences may arise during childhood, negative results materialize during youth (World Bank, 2007).

Given this problem it has been recognized that investing in youngsters at risk will have positive impacts on economic and social development of the region, both now and in the for this reason, programs, policies,

Ecological Dry Toilets, COSMOL Montero

Ecological Dry Toilets, COSMOL Montero

projects that enable the participation of youth in different areas of decision are developed, in order to provide tools to contribute to the world development. The project **Entrepreneur Youngsters for Implementation of Decentralized Wastewater Solutions**, funded by Urban Youth Fund of UN HABITAT, was created as of this concept, with the aim of encouraging youth to develop and pursue ideas in the area of Decentralized Sustainable Sanitation (DSS) this allows working in two major problems of modern society: lack of adequate sanitation systems and lack of employment opportunities for youth.

Until now, The Project has trained about 120 youngsters from the cities of La Paz, Santa Cruz and Chuquisaca in the implementation of Decentralized Sustainable Sanitation projects, with emphasis on Ecological toilets. The training provided knowledge and theoretical-practical tools that will generate business opportunities and sources of employment.

Ecological Dry Toilets COSMOL Montero

As a result we obtained interested and motivated youngsters in the thematic and with a desire to contribute to the development of our country. Some of them have initiated activities around lessons learned with the objective of improve health, prevent deterioration of the environment, take measures to adapt to climate change and improve the quality of life of the population where they live.

The issues presented were: Fundamentals of Sustainable Sanitation Decentralized Ecological Dry Toilets Treatment of feces and urine for agriculture, Marketing and Commercialization of Organic Products and Business Plan.

An important part of this process was the practice: field visits and construction jobs that allowed participants to understand in detail the operation of technology and the process of Sanitation cycle closing.

Youngsters had the chance to meet a new sanitation technology, the Ecological Dry Toilet, an option which does not use water, allows the reuse of waste into agricultural fertilizer, soil improvement and contributes to food security; it is also a measure of adaptation to climate change and raises social security.

Ecological Dry Toilet, COSMOL

Ecological Dry Toilet SUMAJ HUASI

Ecological Dry Toilet SUMAJ HUASI

As a result we obtained not only trained youngsters, but young people interested and motivated in the subject and a desire to contribute to the development of our country. Prevent. Some of them have initiated activities around lessons learned in order to improve health, prevent deterioration of the environment, take measures to adapt to climate change and improve the quality of life of the population where they live

This is just one example that shows the error done by ignoring youngsters for development planning; the potential of new generations will allow to use the energy of youngsters and redirect it to perform positive activities, as some recently developed initiatives for young people have shown that they can be productive members of society and participatory.

Ecological Dry Toilet, COSMOL

Ecological Dry Toilet, COSMOL

MUNICIPAL PLANNING AS A MANAGEMENT TOOL FOR COMPLIANCE AND ENFORCEMENT OF POLICIES ON WATER AND SANITATION SERVICES

Jhonn Gómez M
NODE-SNV Project Consultant

The reference subject raised in this article on the premise of Human Right to Water and Sanitation (HRWS) which constitutes the State public policy supported by current regulations, in strategies, programs and sector action plans. This requires public management tools that enable their application in an objective manner through actions, interventions and orderly and systematic investments to meet the goals of universality and full coverage of water and sanitation of Patriotic Agenda 2025. Also, given the sector conditions, the regulatory, jurisdictional and institutional framework is proposed as an instrument of governance of particular importance for the purpose of implementation and compliance with the goals of HRWS, in sector planning for water and sanitation at Municipal Government level; from where actions and interventions and investments can be activated and stimulated concurrently, synergistically among the four levels of government in implementing the tasks set and assigned by the State Constitution.

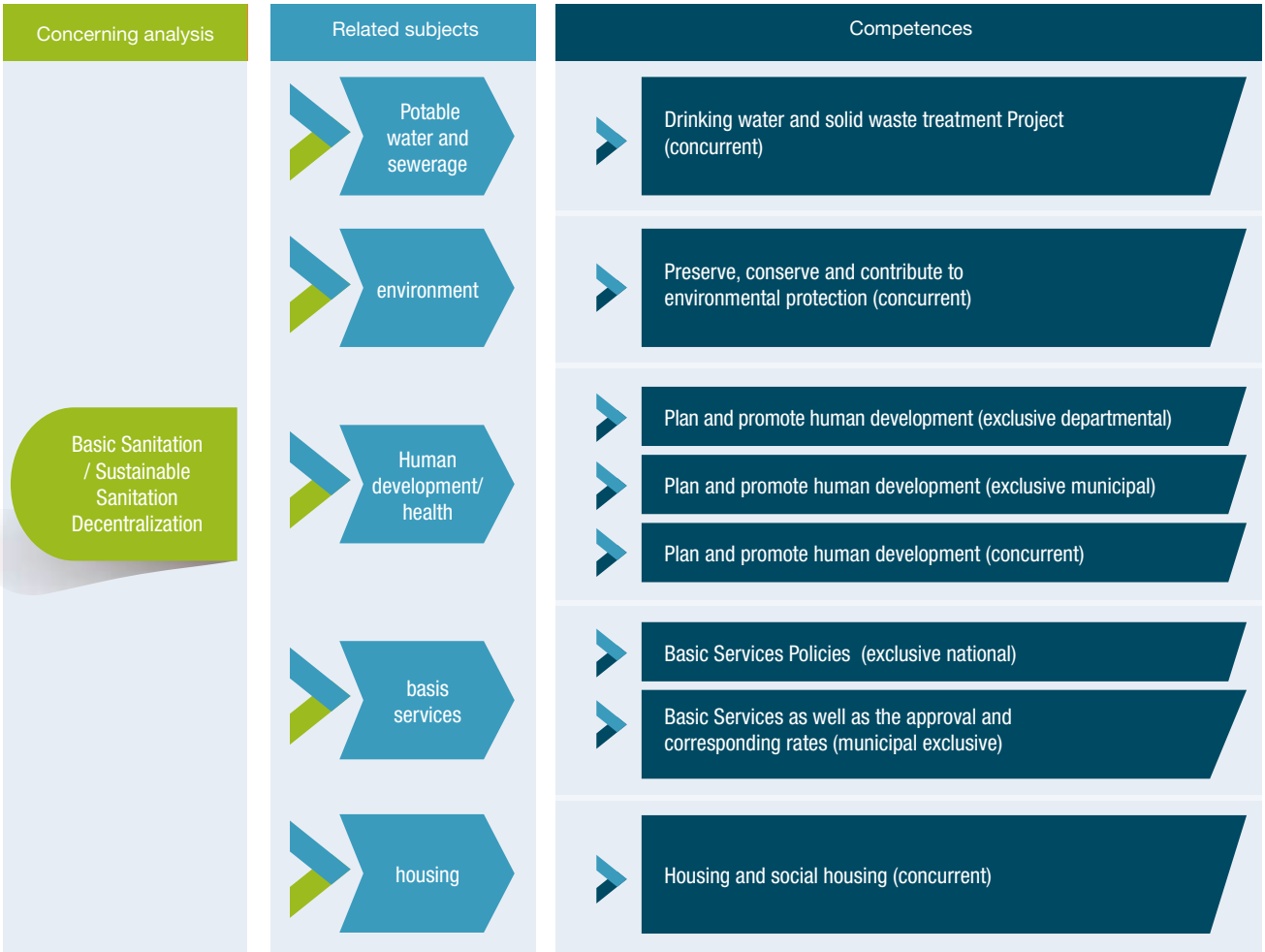
Public policy conceptual framework

"Public policy" is pointed out as an explicit will of the State than by collective interest of society is issued and results in certain mandates, regulations, policies, plans and programs.

It is also understood that "public policies" are the answers that the State or the Public Power gives the needs of the governed as rules, institutions, services, public goods or services. In this sense, public policy is directly linked to the activity of the State as executor, ie, referring to the centralized or decentralized State Administration.

Therefore, public policies reflect not only the most important values of a society, but also the conflict among values. Policies leave manifest which of the many different values are assigned the highest priority in a determined decision (Kraft and Furlong, 2006).

Chart: exclusive and concurrent competences of Political Constitution of the State relating to drinking water and sewerage sectors*



* In the framework of the Constitution of the Multinational State of Bolivia and the Framework of Autonomy and Decentralization Law, Exclusive competences are those in which one level of government has legislative, regulatory and enforcement powers on a given subject, being able to transfer and delegate the last two. Concurrent competences, those in which the legislation corresponds to central State and other departmental and municipal levels exercise simultaneously the regulatory and enforcement powers.

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Public policies for their operation are translated into rules, mandates, regulations and competences which are instruments to operationalize the policies. Therefore it is important to distinguish these competencies in the context of the PSC.

Also, we can assert that public policy in a given sector is constituted as such insofar as it is conceived in concert between public actors and civil society and is implemented in a responsible manner among all stakeholders involved. Therefore, they can be conceived and create through participatory planning processes (Gomez, 2013), with what can concur that "public policies are the design of an intentional collective action" (Aguilar Villanueva, 1996).

Consequently, the public actor, well as the society and other stakeholders involved are aware of their importance, they are jointly responsible for its application in different degrees and ways specific to each stakeholder and keep the subject in "public agenda". For the state, this policy mainstreams in their management through planning and public investment programs and through the creation of rules and adjustment measures and institutional development of policy support.

The nature of public policy and its objective application basically requires active cooperation of the State and involves ensuring that such policies are translated into action, public investment and thus on impacts, the same that may be settled in planning and implementation of strategic and sector plans processes. For this case, we will refer to municipal planning of water and sanitation services whose purpose will be to increase coverage, equitable access, quality and sustainability of such services, aimed at suburban and rural populations in perspective of implementing and enforcing the Human Right to Water and Sanitation.

"From the basic principle of "Water for Life", the State Constitution provides that the basic water and sewer services are a human right. It is also the duty of the Multinational State of Bolivia, ensure full access of the Bolivian population to these services on an equitable basis and in balance and harmony with Mother Earth."

Constitutional mandate: policies, regulations and competences regarding the Human Right to Water and Sanitation

From the basic principle of "Water for Life", the State Constitution provides that basic water and sewer services (clearly referring to basic sanitation in their overall conception), is a human right. It is also the duty of the Multinational State of Bolivia; ensure full access of the Bolivian population to these services on an equitable basis and in balance and harmony with Mother Earth.

For this and other constitutional mandates, the Autonomous Regime and the Allocation System Competence, subsequently endorsed by the Framework Law of Autonomy and Decentralization FLAD, is established, where competences, including on the Water and Sewerage, are defined and related sectors such as health, environment, climate change, housing and habitat and human development.

Following the State Constitution, the Framework Law of Autonomy and Decentralization clarifies and complements the exclusive competence of the Central State Level on "Basic Services Policy" and Concurrent Competence referred to "Potable Water and Solid Waste Treatment Projects" in the following terms:

Competence matrix of the Framework Law of Autonomy and Decentralization derived from State Constitution relating to potable water and basic services

SC sector competences	Competences of the Framework Law of Autonomy and Decentralization derived from State Constitution			
	Central Government level	Departmental Level	Municipal and IOEC level	IOEC Level
Exclusive competence "Basic Services Policy" at central level	Formulate and approve policies, plans and sanitation programs Develop and subsidiary fund sanitation projects with other levels of autonomy	Financing and implementing sanitation projects (as a delegation or transfer).		
Concurrent competence "Projects Potable Water and Solid Waste Treatment Projects".	Develop, fund and execute concurrently and subsidiary sanitation projects.	Develop, fund and execute concurrently and subsidiary sanitation projects. Assist the central level of the State.	Implementing programs and projects. Develop, fund and implement according to competences and concurrences. Provide service through units and cooperatives. Approve rates.	Implementing programs and projects.. Develop, fund and implement according to competences and concurrences. Provide service through units and cooperatives. Approve rates.

IOEC Native Indigenous Peasants Municipalities.

From this mandate, the Plurinational State defined policies and regulations to promote greater coverage of these services through the Sector Development Plan of Basic Sanitation 2011-2015, enactment of the Framework Law of Mother Earth (LMMT), Metropolitan Master Plans, normative provisions, regulatory and "Patriotic Agenda 2025-Pillars of Bolivia Dignified and Sovereign."

The latter is the Medium and Long Term Plan of the Multinational State of Bolivia, where different levels of government provide for a coordinated and integrated vision for national development and fulfillment of the Agenda. For the present case, compliance with the target of 100% of potable water and sewage systems under fair conditions and in balance and harmony with Mother Earth (Pillar No. 2: Socialization and universalization of basic services with sovereignty to Live Well). Finally, it is important that the regional policy framework and competences set by the SC, the Framework Law of Autonomy and Decentralization and the laws in force (1992) and Provision of Water and Sewerage

Services (2000), support and facilitate the availability of the exercise of competences and public investment at different levels of government and concurrently between these levels for water and sanitation sector and fulfilling the mandate of Human Development to Water and Sanitation.

The Autonomous Municipal Governments play an important role in order to meet the policy of HDWS to be holders of the exclusive competence: “Basic Sanitation as well as approval of corresponding rates within its jurisdiction” (Article 302 SC), from where they can articulate synergies and concurrent investments with other levels of government, according to the competencies by developing formulation and generation of Municipal Plans for Water and Sanitation.


Ecological Dry Toilet WFP Riberalta

Strategic action municipal plans for water and sanitation services


Ecological Dry Toilets, WFP Riberalta

Considering the mandate and title to the Exclusive Competence of basic sanitation assigned to Autonomous Municipal Government level, corresponds generate from this level of government actions, interventions and investments for the implementation, application and enforcement of policies and goals for water and sanitation.

The municipality constitutes therefore the epicenter of interventions for the sector where other levels of government concur, according to the joint and combination of assigned competences. Therefore, it is crucial to generate at this level of Government an agile planning instrument to determine policies, strategies, actions and investments to programs and projects in water and sanitation, within the framework of National Planning System and in compliance to munic-

Ecological Dry Toilets WFP Riberalta

ipal competencies[1]. In this sense, this instrument of sector planning for water and sanitation at municipal level should be of strictly strategic nature and emerging and will be aimed at projecting all Multinational State interventions in concurrence with other levels of government, considering the goals of universality of services established by the Patriotic Agenda 2025. For this, the investment program from the Plan should be supported by a strategy of financial sustainability based on a multi-year concurrent public investment program among the different levels of government, ensuring the allocation of public investment resources according to their respective competences to the subject.

1 State Constitution (Art. 302) and municipalities Law 2028 establishes as competence the Municipal Development Planning in accordance with the departmental and national planning and to establish integral planning processes taking into account the principles of coordination, concurrence and subsidiarity in compliance with departmental and national regulations and national systems.

FEDECAAS

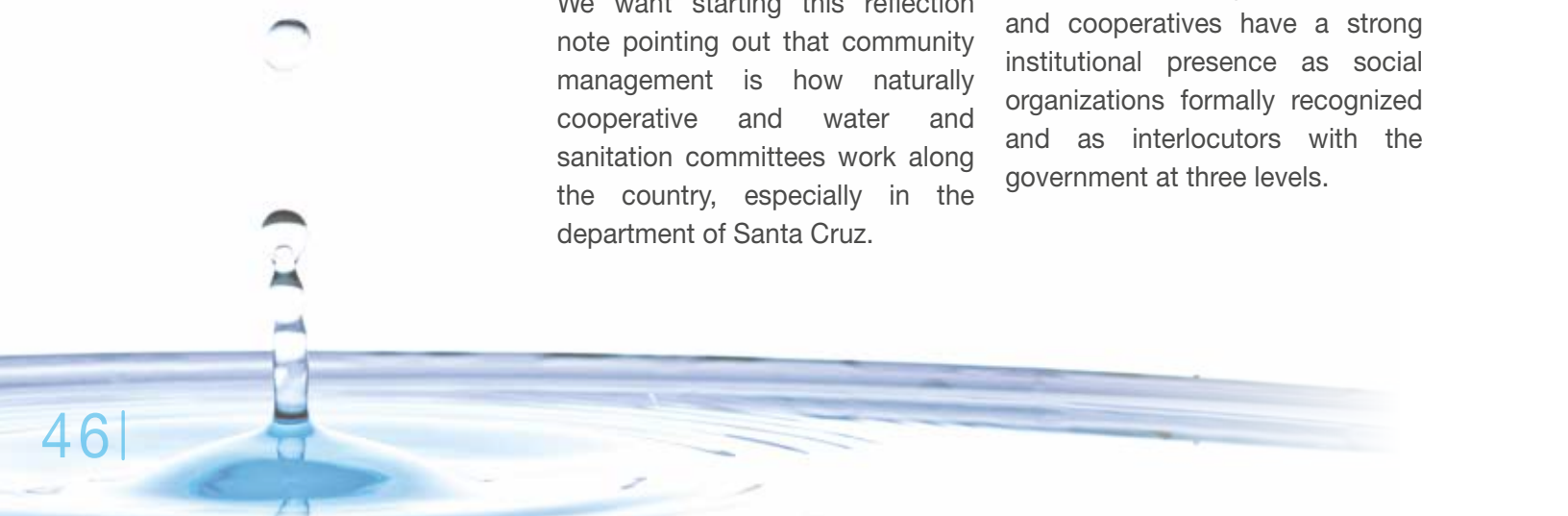
SOLIDARY ASSOCIATION:
THE ROUTE TO SUSTAINABILITY IN WATER AND SANITATION

Gregorio Jaldín F.
Board of Directors President
FEDECAAS

«'They call us poor in the north and that's not true, we live with what we need and we have the most valuable of all, a community. You are poor only when you don't have a community" Pepe Mujica.

We want starting this reflection note pointing out that community management is how naturally cooperative and water and sanitation committees work along the country, especially in the department of Santa Cruz.

Water cooperatives have emerged as a result of the decision of citizens to solve problems by themselves, before the abandonment or absence of the State. Decades have gone until the development model has changed in Bolivia and cooperatives have a strong institutional presence as social organizations formally recognized and as interlocutors with the government at three levels.



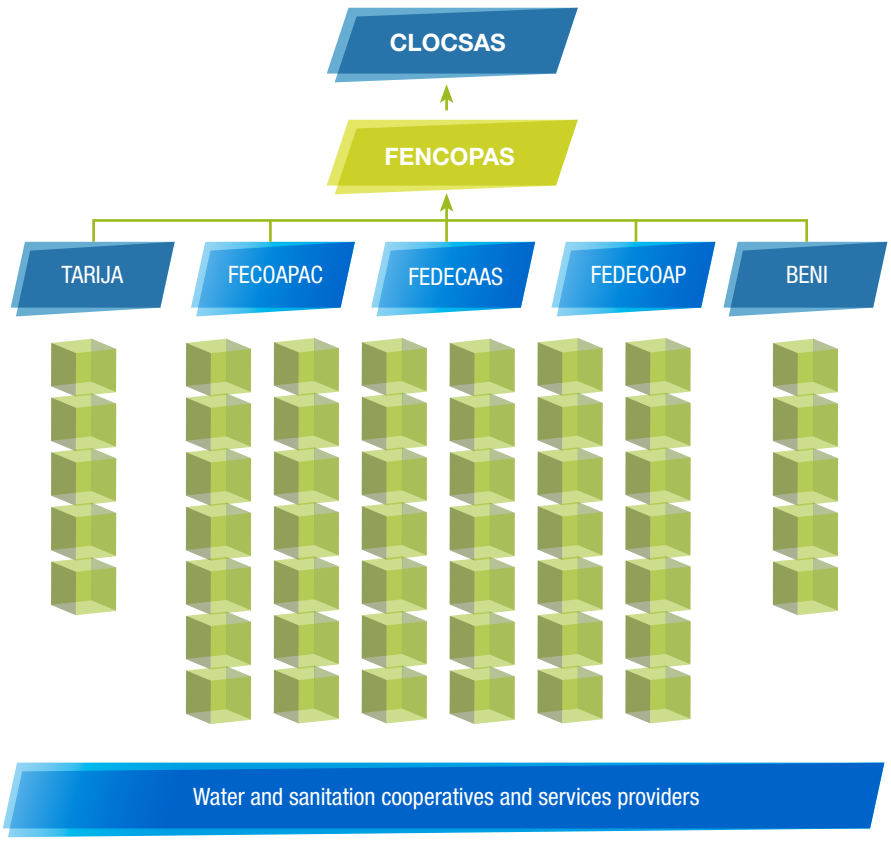
The strength of our organization is based on democratic participation, social control and our supreme goal is service. That is why this perspective is radically opposed to private or business management models, which legitimately should respond to its shareholders and ensure the highest possible return on their investments, but in Bolivia it has been demonstrated that water commercialization, typical of the period called neoliberal, has failed because most of the population is poor and it was not attractive for business interests to invest where there was no effective demand.

Up-to-date, the State Constitution recognizes that public services, specifically water, cannot be privatized or concessions, precisely to ensure compliance with the Human Right to Water, proposed by Bolivia to the United Nations General Assembly and approved through resolution in global scope.

Cooperatives, on the other hand, essentially are associative, i.e., seeking alliances among operators to achieve better results. The Constitution of the Departmental Federation of Water and Sewerage Cooperatives of Santa Cruz (FEDECAAS) is precisely the result of a long process of mobilization to achieve spaces of representation in the State; it was not easy to consolidate in Santa Cruz. Indeed, on several fronts, intended to encourage the creation of parallel organizations within the department to

Up-to-date, State Constitution recognizes that public services, specifically water, cannot be privatized or concessions, precisely to ensure compliance with Human Right to Water.

Chart: Structure associativity on water and sanitation



Community management is the way that cooperatives and water and sanitation committees naturally work throughout the country.

fragment effort and reduce the power of unity. Today, FEDECAAS is the only departmental association and has encouraged the formation of associations other brotherly departments. We are also promoters of the National Federation of Water and Sanitation Cooperatives (FENCOPAS) and in parallel have underpinned the association in Latin America, having organized the First Meeting of Community Organizations in Samaipata (Santa Cruz), 2010. Currently, already constituted the Latin American Confederation of Community Organizations for Water and Sanitation Services (CLOCSAS), the 5th Meeting was held and from this international forum begins to launch strategic guidelines to advance the realization of the human right to water and sanitation and the preservation of gifts from nature.

In addition to the concept of community management in CLOCSAS we are reflecting on the approach of public good that should have water. As defined by the expert of the Confederation, Bernardo Toro: *"a public good is something equal for all"*. From that perspective, education would not be a public good, as there is private and public education and within these segments, multiple variants. However, in northern European countries such as Sweden, the Volvo owner's son and the son of his maid, study in the same school.

Subsequently, a new challenge is, not only achieve the highest possible coverage, for example the Country Agenda, states potable water to 100% of the population by 2020 and the Agenda 2025, five years later, universalize sanitation services to 100% as well, but work on water quality for all Bolivians alike.

Biojardinera El Alto Sumaj Huasi

Ecological Dry Toilet, Montero

But in no way we intend to confuse the population and suspect that a Human Right to Water and the concept of public good has to do with the gratuity of the service, it would be irresponsible to pretend total subsidies from the State, thus resulting in major problems for the whole sector. Rather we intend to raise awareness and train providers, whether cooperatives or not, to manage the gift of water with maximum effectiveness, taking partners or users as the center of interest.

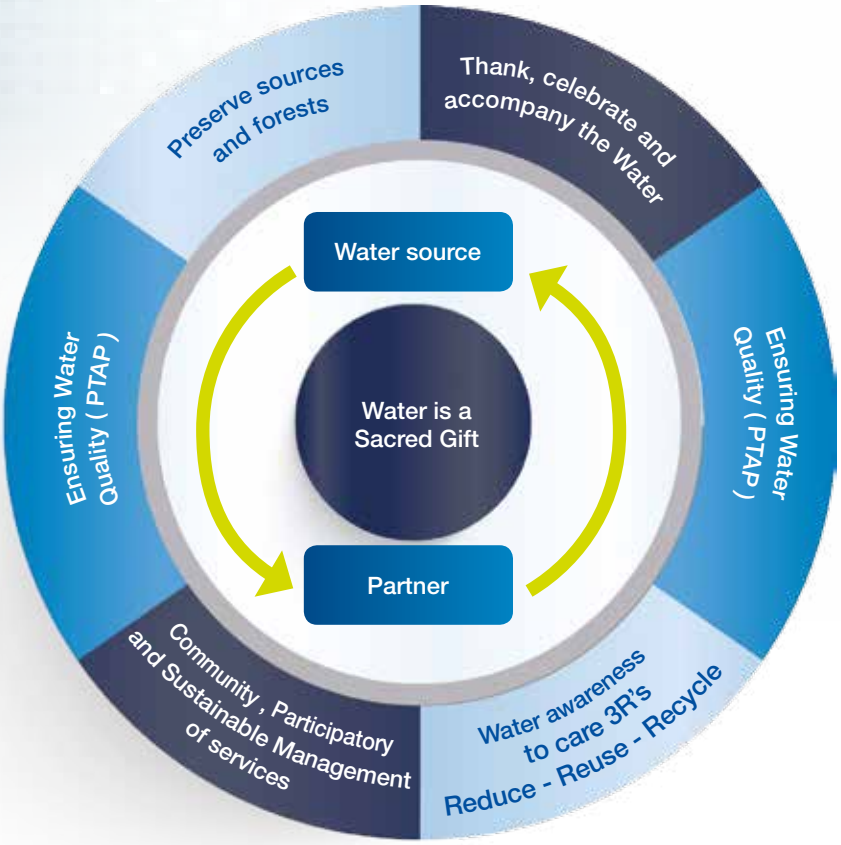
Rates must cover, without any mitigating, at least the operation and maintenance of water and sewerage services, but based on intelligent design of rate structures focus on the principle of solidarity, allow everyone have access to services in the essential volume and required quality for Living

Well. Then solidarity rates, rather than threats to financial sustainability of providers, are rather to be their greatest strength, since it is a mechanism that balances income differences of population and carry out the human right to water and sanitation and the principle of public that characterizes these services.

In the same innovative line in FEDECAAS we have designed an "integrated cycle of water conscious use" that, unlike the lineal relationship of "power-user" transcends to pay attention also to the source, to forests, to the need to generalize sanitation in their most viable forms such as decentralized or ecological way it also includes the provision of safe water and strongly appeals to environmental and sanitary education for the population to reuse, recycle and reuse water.

Finally, we believe that since water is a sacred gift, it should also be part of our celebrations, lavishing our gratitude for sharing its life with all forms of existence on the planet. It is good to remember that without water there are no forests and without forest there is no life.

Chart: Integral cycle of conscious use of water



Unified program of capacity developments

Commemorating the third consecutive month of Water and Life, on 23 and October 24, 2014, the "First International Conference on Water, Sanitation and Environment" was held in the city of Santa Cruz hosted by the National Forestry Development Fund (FONABOSQUE) and the Departmental Federation of Water and Sanitation Cooperatives in Santa Cruz (FEDECAAS), sponsored by several organizations including the SNV.

During the event the "Skills Development Course for men and women leaders to promote harmonious and sustainable changes" was officially launched, an emerging initiative from a funding competition organized by AVINA Foundation, being winning the Departmental Federation of Water and Sanitary Sewerage Cooperatives in Santa Cruz (FEDECAAS) in alliance with

National Service for Sustainability in Water and Sanitation (SENASBA) and co-sponsored by the European Union, through its ATI-PASA P&R program and the German Technical Cooperation (GTZ).

The program will last eight months and involving 12 cooperatives of Santa Cruz, whose management and technical staff will be trained in all aspects of corporate management by national and international experts, and will have a training component in Andean-Amazonian worldview practices and ancestral ceremonies planned in Samaipata. Gregorio Jaldín, Chairman of the Board of FEDECAAS, said that for service providers to take care of water as a living being we should become skilled in the vision of our people, since for thousands of years ago they have co-existed with the water and Mother Earth, consider them as sacred beings.

"The strength of our organization is based on democratic participation, social control and our supreme goal is the service."

ECOLOGICAL SANITATION, A NEW OPTION OF SANITATION

Ecological Dry Toilet, Suma Huasi, Achocalla

Carla Becerra
NODE-SNV Project

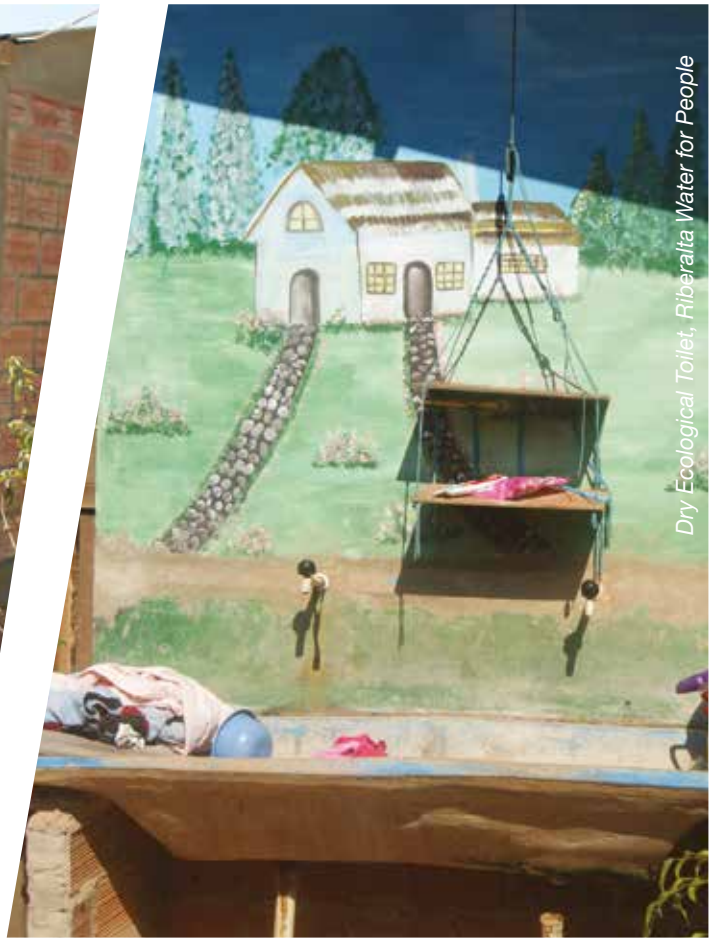
Historical processes by the struggle of natural resources as the "Water War" and "Black October" in Bolivia, are linked to the empowerment of social movements in decision-making and access to basic services.

On the subject of water and sanitation has not a different reality, companies providers of water services usually found connected to sanitation, causing expulsion of

Transnational companies such as Suez operator "Aguas del Illimani" in La Paz, and "Aguas del Tunari", with the consortium Bechtel and Edison in Cochabamba.

Such processes were accompanied by a demographic expansion in capital

Dry Ecological Toitel, Sumaj Huasi Achocalla



Dry Ecological Toilet, Riberalta Water for People

cities, attributed to rural-urban migration, where the population opted for peri-urban areas. These processes reflect a country in continuous mono-extractive process of selling natural resources and denied access to basic services in the low levels of Bolivian society.

By 2004, authorities had greater difficulties in expanding conventional sanitation services, therefore, the Superintendence of Sanitation (SISAB) today AAPS was looking for immediate solutions through the Federations of Neighborhood Committees (FEJUVEs) in the city of El Alto, setting for the inhabitants the option of Decentralized Ecological Dry Toilets.

Thus a new option sanitation is born, which represents a change of host structure as mentioned by Duch and Mèilch[1], "(...)Only through my adherence to a world already

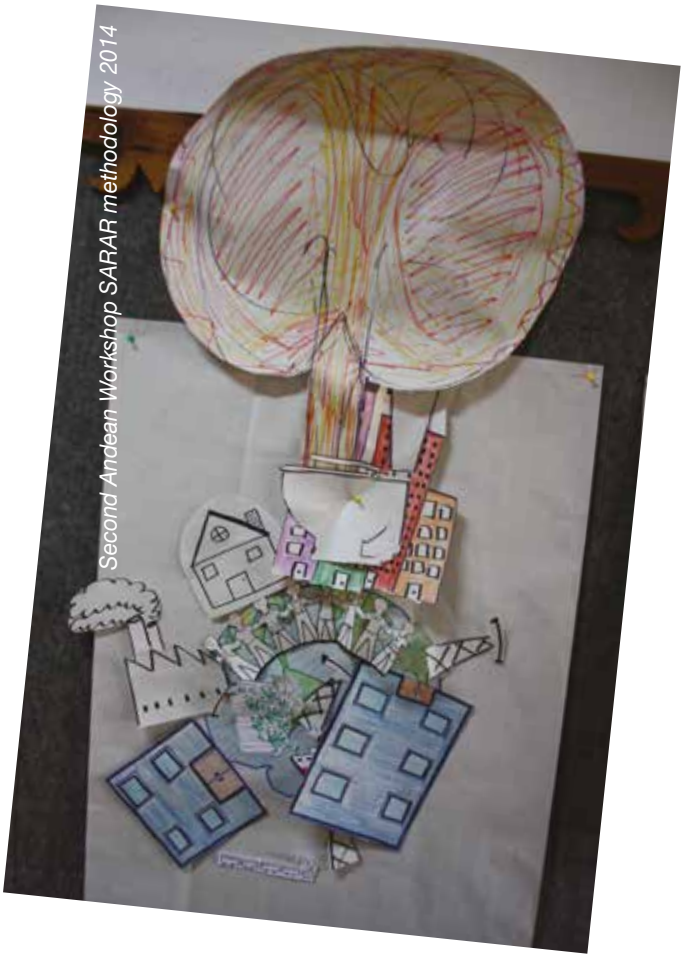
"The process of civilizing habits will change constantly the social use of the toilets because, working the Decentralized Dry sanitation perspective represents transforming a vision and social conception of the conventional toilet habit."

1 Embodiment scenarios. Anthropology of Everyday Life 2/1, Editorial Trotta SA, Madrid - Spain. 2005.

predated and formed by my body reality has reason to be the “I think” what is to be is not a kind of earlier precedent it is a sort of earlier precedent to life itself, but comes into existence from the original dimension of reality, which it is but my bodily exposure to the world. “. (Duch y Mèilch; 2005:169). Therefore, the process of civilization of the customs will constantly change the social use of the toilets because when working the prospect of Decentralized Dry Sanitation represents a vision and transform social conception of habit conventional toilet.

For example, when you consult a person how to conceive the Dry Toilet, he tends to resemble that of latrine or cesspit and odor, articulating stereotypes and interpersonal relationships; it is only through the approach to the use of a dry toilet changing its visual and olfactory perception of toilet.

“Working with projects of this importance particularly led to a process of acceptance and family empowerment by means of a redesign of bodily practices”



Second Andean Workshop SARAR methodology 2014

Working with projects with such importance led particularly to a process of acceptance and family empowerment by means of a redesign of corporal practices through a strict and repeatable method to allow the correct use of the dry toilet to avoid technical failures of the same, since this technology, is not driving, breaks the paradigm of conventional toilet because the user does not pull the string and forget where excreta went to stop.

It is this process of domestication of excreta that can change the original dimension of reality as a resource that provides the success of this type of sanitation, since it interacts body, technology and reuse, as a cycle closing circle where the bodily exposure has a pre-given and daily conception of

Ecological Dry Toilet, Montero SNV

conventional toilets practice, which impeded a first approximation to the correct operation of the dry toilets, this because from an early age we assimilate the experience of going to the toilet and pull the string is generally associated to disgust, repugnance as well as other signs and collective symbols.

Every society projects from its core vision of sanitation attributed to modernity through the city agglomerations, represented in public management of water and sanitation; then dry sanitation incorporates a deconstruction of "(…) learning of bodily modalities of the individual relationship with the world (…)" (LE BRETON; 2002:9)[2] and they are social and cultural transformations[3] that enable innovation in lifestyle and stimulate the attitude change, which empower the development of the modules of dry toilets increasingly similar to conventional toilets with the incorporation of sinks, showers and electricity as a counterpart of families, facilitating social acceptance of beneficiaries and use in a sustainable manner, thus improving their quality of life.

2 LE BRETON; David. The sociology of the body. New Vision editions. Buenos Aires, Argentina. 2002.

3 Such as the struggle for access to basic services.

GABRIEL RENÉ MORENO UNIVERSITY PROJECTS TO THE COMMUNITY:

STUDENT RESEARCH WORK IN THE SPECIALTY OF

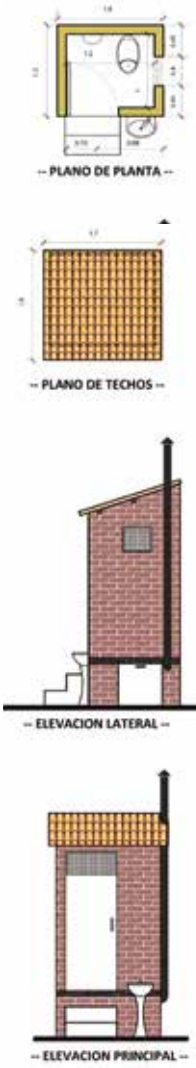
ECOLOGICAL SANITATION AND CLIMATE CHANGE

Jhonn Gómez
Gonzalo Ameller
NODE-SNV Project Consultants

As part of Post-graduate course on methodological process training in the specialty in Ecological Sanitation and Climate Change 32 students from the University Gabriel René Moreno (Santa Cruz) have developed the process of Applied Research work Module 1: Decentralized Sustainable Sanitation Fundamentals, generating important results to promote the implementation of non-conventional sanitation systems in seven districts lacking this service.

The knowledge taught in Module 1 included thematic on Situation of Basic Sanitation Sector in Bolivia; Composition and Politics of Water and Sanitation Sector Agenda in Bolivia; institutional and regulatory Framework and Approach to Decentralized Sustainable Sanitation.

Therefore, the Applied Research Work planned for this module consisted of apply the practice of intervention in districts (urban or rural) lacking of sewerage and sanitation, services in order to characterize the situation of families and their expectations on this subject; also sensitize and report on health



"Design of Ecological Dry Toilet projected by students for community Las Lomitas, District 12 Municipality of Santa Cruz"

> "5 communities and 2 urban neighborhoods have proposals for implementation of sanitation services (2 Decentralized Wastewater Treatment Plants and 5 modules of Ecological Dry Toilets)"

Photo 1: the file sent

effects and environmental pollution, the existence of feasible sanitation options to be implemented in context and local reality as well as the responsibility and competences of the State to carry out these services under the Constitutional Right to Water and Sanitation; participatory design of implementation proposal for a Decentralized Sustainable Sanitation System Model; start negotiations with the municipal authority and route negotiations covered and under the responsibility of representative social organizations

This way, the basic methodological procedure used was as follows:

- Identification of potential area or district for the implementation of a Decentralized Sanitation system (Ecological Dry Toilets – EDT or Wastewater Treatment Plants – D-WWTP).
- Identification, generation of agreements and work with the leadership of Territorial Base Organizations (OTB) Neighborhood Committee or other type of representative organization.
- Awareness, information, generation of interest and local demand for Decentralized Sustainable Sanitation systems with involved families (potential beneficiaries).
- Definition of Decentralized Sustainable Sanitation System (DSS) and mode of administration of appropriate service for the area or district including the way of cycle closure and reuse.

Municipal District 12 Municipalities of Santa Cruz

- Meeting with the municipal unit, sub districts or town district to know perspectives of sanitation systems in the area and discuss possible DSS interests.
- Document of need development, justification and basis for the technical proposal to design the implementation project.
- Generation of supporting documents, agreements, minutes and resolutions.

To the purpose of the Applied Research job satisfaction, the results showed that 5 communities and 2 urban neighborhoods have proposals for implementation of sanitation services (2 Decentralized Wastewater Treatment Plants and 5 modules of Ecological Dry Toilets) including the modalities for operating, cycle closure and reuse in the production and whose representative social authorities have their respective documentation and management and negotiation skills with their municipal governments for implementation in favor of a total of 1271 families.

Results summary chart of Applied Research Work. Module 1 Specialty Course in Ecological Sanitation and Climate Change UAGRM-SNV

Municipality	District	Current Sanitation Situation	DSS Modality proposal	Coverage of families to be benefited	Projected cycle closure and reuse
Porongo	Community El Magué	Latrines, Septic wells, Open air	EDT	90 families	Fruit
Santa Cruz	12 Abril UV 169 neighbourhood	Septic tanks	D-WWTP	250 families	Ornamental
La Guardia	Barrio El Carmen	Septic tanks	D-WWTP	760 families	Ornamental
Cuatro Cañadas	Community 4 de Marzo	Letrines	EDT	50 families	Orchards
Santa Cruz	Community Las Lomitas	Latrines and open air	EDT/with composting centre	51 families	Agricultural
Carmen Rivero Torres	Community de Copaibo	Latrines	EDT	20 families	Agricultural
Warnes	Community LaGamas	Latrines, Septic wells, Open air	EDT/with composting centre	50 families	Crops

"32 students from the University Gabriel René Moreno have developed the process of Applied Research work, as part of course on methodological process training in the specialty in Ecological Sanitation and Climate Change."

Therefore, it is important to emphasize the value and effectiveness of the methodology Applied Research Work established for this course by the UAGRM for purposes of applying and validating the knowledge acquired in practice and local reality. On the other hand, it is important to recognize the ability and level of training of students in this course, who have developed this research fully, having obtained results beyond initial expectations.

INTERVIEW TO LUIS MARKA, GENERAL DIRECTOR OF IRRIGATION VICE MINISTRYOF WATER RESOURCES AND IRRIGATION:

VICE MINISTRY OF WATER RESOURCES AND IRRIGATION PROMOTES RESPONSIBLE USE OF TREATED WATER

Interviewed by Brenda Pardo
REUSSO – SNV magazine editor

Luis Marka is Agricultural Engineer specialized in irrigation, currently holds the position of General Director of Irrigation in the Ministry of Environment and Water in Bolivia, conducted studies and research related to irrigation in public and private institution. He is member of the Joint Commission for the reuse of wastewater and focal point in Bolivia since 2011 for triangular cooperation project "Reuse of treated wastewater for irrigation" among Mexico, Germany and Bolivia.

"The whole problem of reuse has to do with responsibilities of many institutions, even from the same population."

1. Is there an institutional and regulatory framework of water reuse for irrigation purposes in Bolivia? Which is?

An institutional framework does exist from the concept of water management. The Ministry of Environment and Water, with its three Vice Ministries, one of them the Vice Ministry of Water Resources and Irrigation is the entity that works policies and rules of irrigation sector; the case of reuse is a particular thematic which is part of water management.

Policy development related to reuse in the country is scarce, it is worth mentioning that the Ministry of Environment and Water has been created in 2009, and so far, in coordination with other entities and cooperation counted with related information to reuse and irrigation. We can mention that the regulatory development for reuse is in process.

2. Who is the sector head of reuse topic?

On the subject of reuse we could say that there are various entities responsible for representing the problem. With regard to irrigation, the Vice Minister of Water Resources and Irrigation is the responsible instance, however, since the reuse relates to Wastewater Treatment Plants there is a shared responsibility with the Vice Ministry of Drinking Water and Basic Sanitation, in the same way, with the Ministry of Environment on the issue of water quality and pollution.

3. Does the Vice Ministry work in conjunction with these vice ministries?

Mainly we work with the Vice Ministry of Environment, as we are under the same Ministry (ME&W), specifically with the subject of reuse; we worked with the Vice Ministry of Drinking Water and Basic Sanitation because this institution is in charge of policies and strategies for potable water and basic sanitation.

A problem that we have identified in the country in recent years and it constitutes a challenge is put into operation wastewater treatment plants these plants are under responsibility of municipalities in terms of its operation.

All these problems of reuse have to do with responsibilities of many institutions, even from the same population.

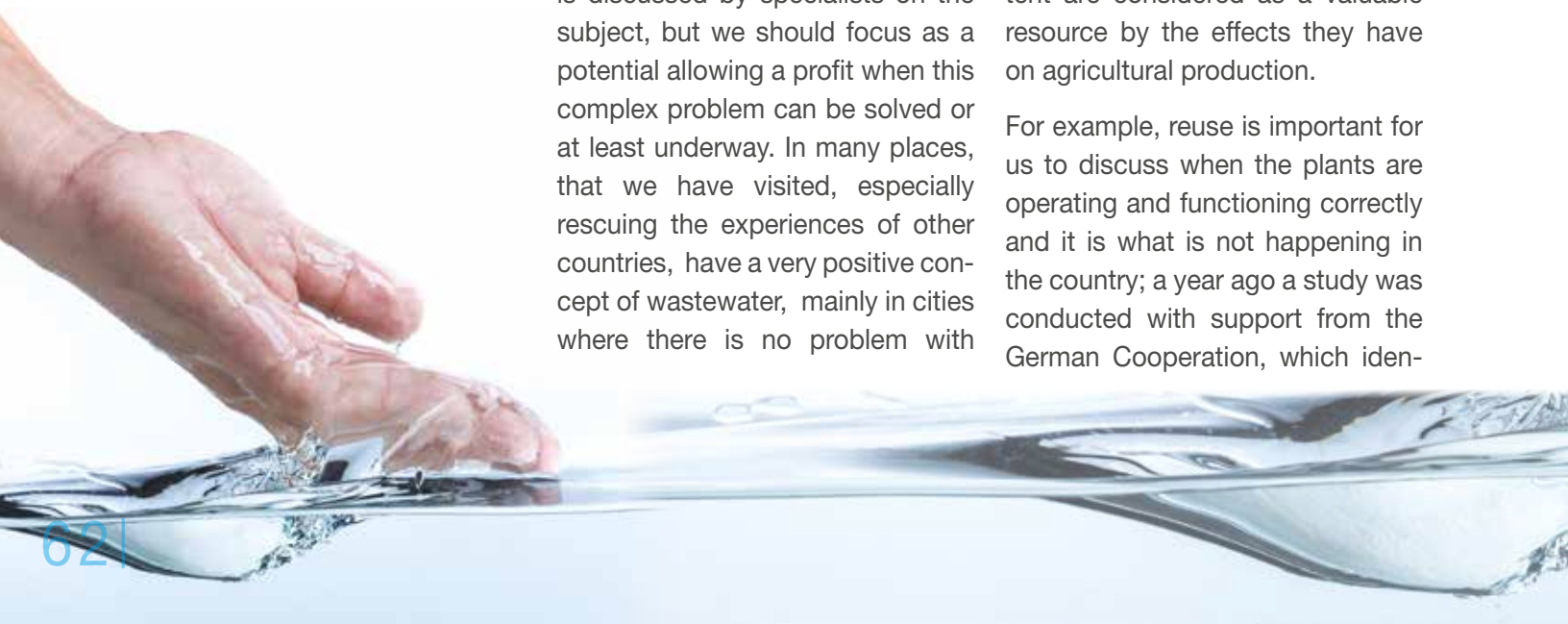
There is a pending work, from my point of view, to raising awareness of the general population, we should know what happens to the water once used; or example, and generally the cities consume agricultural products, but there is no certainty that these products are possibly being irrigated with wastewater. From the farmer's side, it is necessary to raise awareness about what measures should be considered to use these waters and which crops are or what kind of crops can be irrigated with least risk for both the consumer and the producer in this process.

> *"The country has an irrigated area of over 303,000 hectares approximately. These hectares in 5.600 irrigation systems are basically self-managed, namely, they are managed, operated and maintained by the farmers themselves."*

4. Where should the concept of reuse be focused and what are their applications?

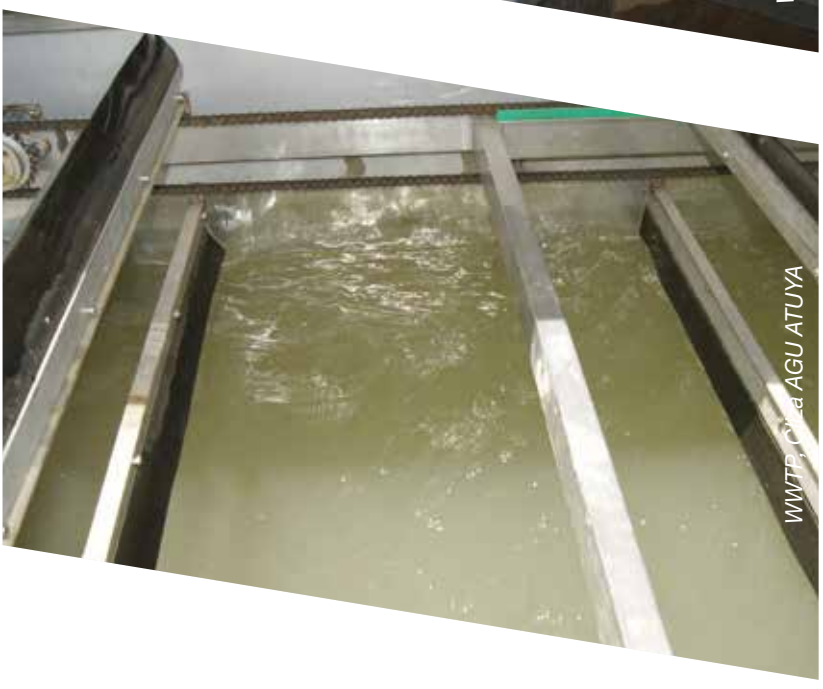
Regarding the concept of reuse, it has a certain similarity with the concept of recycling, although that term is discussed by specialists on the subject, but we should focus as a potential allowing a profit when this complex problem can be solved or at least underway. In many places, that we have visited, especially rescuing the experiences of other countries, have a very positive concept of wastewater, mainly in cities where there is no problem with heavy metals, there is no industry, such is the case in many cities, then these waters for its nutrient content are considered as a valuable resource by the effects they have on agricultural production.

For example, reuse is important for us to discuss when the plants are operating and functioning correctly and it is what is not happening in the country; a year ago a study was conducted with support from the German Cooperation, which iden-



tified nationwide which sites reuse is being performed, regardless whether there is a treatment plant or not, and it is concluded that in several places within the country reuse is practiced, but in those places where there is a plant the big problem is that they are not operating and are not being maintained due to many factors such as economic and lack of skills.

WWTP, Cliza AGU ATUYA


WWTP, Cliza AGU ATUYA

5. From the perspective of VRHR, what role does the WWTP play? Intended for water reuse?

Treatment plants for reuse of water play a decisive role. Referred to a survey we did, the plants actually affect the quality of water that subsequently facilitates or promotes a responsible use of treated water. We have little regulation in the country for reuse and we need to develop it. We have been working on a proposal for the plants can generate a treatment to have an acceptable water quality, but from the performed diagnosis we believe that the challenges in terms of operation, maintenance and awareness to the population about the importance of plants are topics we have to solve as State.

Another factor that I consider important in the country and I rescue the experience of Cochabamba, is that the population growth of these plants have been built at any time now are overloaded, then because of this problem, institutions along with the Departmental Government are developing a strategy to decentralize these plants or build a number of plants in jurisdictions of municipalities so that the plant capacity in Cochabamba could be assimilated; there we have encountered difficulties regarding the resistance from neighbors where we are trying to implement the plant, due to bad experiences they had in the past, which have been not very encouraging, mainly for reasons of poor operation and maintenance, which generate odors, depreciation of the value of land in the surrounding areas to the plant and other factors.

6. In general, what is the current status of irrigation and water reuse in the country?

On the subject of irrigation, we as Vice Ministry, handle hectares under irrigation in the country as an indicator hectares, and we could point out that the year 2012 (the year that an updated inventory of irrigation systems was carried out) the country has over 303,000 hectares of watered surface approximately. These 5,600 hectares with irrigation systems are basically self-management, it means, they are run, operated and maintained by the farmers themselves and what the State is doing in recent years is the promotion of investments to improve irrigation systems and in some cases to build new systems. A reality in the country is that almost all of these water sources are being used and irrigation sector uses an approximate percentage of 80% water in the country, i.e. all the irrigation systems use water in a traditional way (generation after generation) and we are trying to promote the concept of efficient use of water, and also promoting water harvesting, through infrastructure such as dams and to a lesser extent water reservoirs, with the objective that communities be prepared to drought events or certain climatic distortions. With regard to reuse through this inventory we determined that there are about 7,000 hectares irrigated with untreated wastewater.

VISIT TO PAMPLONA - LIMA

AS PART OF THE EXCHANGE OF EXPERIENCE BETWEEN X-RUNNER AND NODO/SNV

Henry Morales M.
NODE Project Consultant

During December Peru became into a multitude of scenarios, with the eyes of the world watching how a country with an area of 1,285,216 km2 develops and seeks to solve the problems of climate change while at the same time, meet the basic needs of everyone, which are growing and seem to be unreachable even more when talking to basic sanitation. In the capital, Lima, with more than 10,000 million, an ordinary day the reality surpasses fiction after dawn.

The landscape in Pamplona a peri-urban settlement is the work and intervention area of the company X-RUNNER. This place shows the extreme poverty existing not only at the place but many others which are marginal belts present in big cities.

Precarious housing in inadequate conditions, without water drains; at first glance have around 900 thousand or more families that form the settlement.

Houses joined to others becoming evident overcrowding, clearing stones and garbage, wet streets because of black waters leaking and excreta of animals, housing conditions that show the urgent need for intelligent solutions especially for basic sanitation at the place.

Currently, the NGO family's tries to make a difference through the implementation of ecological dry toilets portable able of functioning without water and where waste can be recycled as organic fertilizer aimed at ornamental processes. It is clear that the operation of these toilets require a process of collection, transportation, treatment and composting which is routed by X-RUNNER, a company created by the NGO, ("X" means any and "Runner" broker to meet the needs of others ").

X-RUNNER collects human waste from 150 families, with a projection to reach in short term to about 500 families.

X-RUNNER, known as family's in Pamplona, offers a basic service, based on customer observed system is organized, punctual, responsible and above all reliable to improve the quality of life and health of their users as well as for creating a cleaner environment for them. Nowadays the team collects human waste from 150 families, with a projection to reach in the short term to about 500 families, and then to replicate the model in various domestic provinces and, why not, in other countries in the region

In contrast, as everything in life, resources generated by the toilets are many, and therefore requires the participation of many actors and the Government; clear rules indicating what are the parameters or safety standards for safe composting are needed. Sustainability to provide service to more families is still a pending issue of calculating "Excel can do everything!" "but as long as there will be grants, that is subsidies, no worries, we go further step by step, what matters is the social cause" and work it through exchanges of information and experiences among NODE of knowledge in Decentralized Sustainable

Sanitation NODE partner institutions, as well as relationship with other international organizations, as it was on December 4 and 5 where institutions like SENASBA, AAPS, Sumaj Huasi Foundation, Water for People, AGUATUYA Foundation, SNV and NODE were present.

Group knowledge sharing Peru Bolivia

INTERVIEW TO JUAN MANUEL MORGAN SAGASTUME (MEXICO)

WATER MANAGEMENT SHOULD BE CONSIDERED AS STRATEGIC FOR DEVELOPMENT AND GROWTH OF A COUNTRYAS WELL AS STRUGGLE AGAINST POVERTY

Juan Manuel Morgan *is a researcher of the Institute of Engineering, National Autonomous University of Mexico (UNAM), specialized in hydraulic and environmental engineering. He belongs to the team of Environmental Engineering Institute of Engineering Coordination at UNAM and is founding member of IBTech.*

1. What are the most effective ways to treat wastewater nowadays?

The number of existing technologies is finite and develop relatively slow progress; apparently the diversity of technological options in the field of wastewater treatment It seems to be very wide, but it is not so in reality. Depending on the conditions of project concerned and if restricted to the treatment of wastewater from municipal sources, it appears that the most frequent use of technologies and their integration into treatment trains is reduced to less than eight.

To answer the question, we should consider the concept of sustainability which comprises and must weighs social, economic and environmental aspects. In Latin America, certainly it is to be preferred biological systems over the physicochemical and within biological, anaerobic systems. With this general criterion of technology selection is possible to route and focus a project to be sustainable.

A technology is likely to be sustainable when in its conception and a feature considers the least possible use of inputs and energy and is well adapted to the conditions of the social and economic environment that surrounds it; ie use

of local resources and inputs to the extent possible and to provide the least impact on the environment, through control of its waste and emissions, preferably transforming them into byproducts capable of harnessing in the environment.

2. What does understanding sanitation mean from treatment plants?

It is meant by the concept of sanitation or sanitation service the wastewater piping to lead them to a treatment plant in which they will be treated to meet certain environmental regulations or for a specific use.

Sanitation is not only the conduct of wastewaters away from the source, it is clear that the central element of sanitation treatment is the plant where pollution is transformed and eliminated.

3. What is the level of water treatment at international level and what is their impact?

In general terms it is in the third world where everything is to be done, Latin America is not the exception, with only a treatment level around 20% in most countries Chile is the exception with a treatment level of 100%.

In developed countries, the issue of wastewater treatment is not focused so, it has covered all the treatment of wastewater generated in terms of organic matter removal; at present they concentrate on improving the quality of treatment for the removal and nutrient recovery (especially P) in much more complex treatment plants in their design and operation of conventional systems for removing organic material.

In underdeveloped countries (known as developing countries as well) at least in Latin America, is still considering how, when, where and with what economic resources treat 80% of wastewater that every day is indiscriminately dumped into water bodies, seriously polluting natural resources.

In some countries there have been cases which invested heavily in infrastructure to treat wastewater, however, it has not been possible to maintain operating plants due to a multiplicity of conditions that have to do with the technical (technology selection) but well-conditioned by political, economic, cultural and social factors.

4. What is the current situation in Mexico regarding this subject?

In the past fifteen years, Mexico has made a commendable effort to increase the infrastructure for wastewater treatment until reaching, according to official data, a level of treatment about 47% of generated municipal wastewater.

However, the stark reality has made this installed capacity is not operating it is estimated over 50% of the installed plants) or what is done under design efficiencies.

Many treatment plants in the municipal area are abandoned or with serious flaws that prevent their operation at full load, due to lack of economic resources that allow pay for the energy and supplies they require.

There were resources for investment but not for maintenance of the treatment systems where you have to ensure their operation with a 20-year horizon.

The factors not only reduce to economy; there are legal aspects, among others, (clear legislation to determine responsibilities), social (cultural, aspects environmental education, training, technological development, etc.) and political (antagonistic political environment, corruption, violence, etc.) that have negatively influenced the operation and maintenance of systems for wastewater treatment.

Another aspect is the choice of technology that has been made under the scheme of a market fully open to allow the intrusion in the market for systems that are not necessarily appropriate for the context of Mexico.

Mexican authorities are considering new schemes for investment in this type of infrastructure that contribute to the sustainability of water management, take into account the aspect of climate change that can be maintained and operated properly during its projected useful life and, in short, contribute to an integral watershed management in Mexico.

5. What are the most appropriate criteria for selecting technology?

The person or the group faced with the selection of a technology or wastewater treatment system should consider technical, economic, environmental and even social aspects, often in a marketing context not entirely truthful. This makes the responsible for taking decisions and his support team must evaluate several aspects.

Unfortunately, there are offers on the market that can be described as fraudulent as they offer levels of technical treatment and economically impossible, it still detect some of the main challenges facing the responsible for taking decisions.

The treatment plant must include equipment which can provide them with maintenance in the country or region and there should be a sufficient variety of parts with acceptable delivery time.

Considering the above, integration and selection of technologies for treatment of wastewater should be directed and focused by the State under eminently technical criteria properly supported due to the huge diversity of products offered in the market, some of them do not necessarily apply in the Latin America context, I dare say.

In addition to this, one must consider that municipal structures do not have a deep technical understanding to discern what is appropriate, so that the selection of technologies for treatment of municipal wastewater is an issue that should not be left to the free market whose interest it is not necessarily compatible with the needs of the population.

> *"In developing countries at least in Latin America, is still considering how, when, where and with what economic resources treat 80% of wastewater that every day is indiscriminately dumped into water bodies, seriously polluting natural resources."*

In this sense, it becomes necessary that the State must act on the following lines:

- Define a public policy on promoting sustainable technologies in the area of the country concerned and align the actions of sanitation with a national strategy on Climate Change
- Promote technologies considered in the treatment train anaerobic systems as a first stage, preferably an anaerobic reactor of upflow sludge bed (known in the technical field as UASB for its acronym in English) with the equipment necessary to capture and a safe burning of generated biogas. This gas could be exploited to generate electricity in large installations.
- Fulfill with regulations that could require higher quality than the anaerobic effluent can contribute, aerobic technologies may be used followed by physicochemical processes if treatment requires.
- In the case of the use of anaerobic lagoons, they should be covered somehow to capture and burn GHG emissions, failure to do so what is done is to transfer water pollution to the atmosphere.
- Legislation is needed to have technical standards governing emissions of odors and noise emission in wastewater treatment plants.
- Legislate more effectively to require those responsible for water management in general to preserve the associated documentation, report and transparent operations in the sector.
- Legislate to raise environmental education strategically to a point which effectively permeates knowledge and cultural heritage of population.

Water management should be considered as strategic for development and growth of a country, as well as a determining factor to struggle against poverty

6. Which are the main problems regarding the administration of plants and possible alternatives?

The main problems, at least in Mexico, but I am afraid they may be well extrapolated to the Latin American context, among the most important, are: lack of financial resources for the construction, rehabilitation and maintenance of infrastructure for the treatment of wastewater; high costs of electricity and chemical reagents for the operation; lack of training of operational staff or unresponsive to the real needs of the sector, lack of policies for the renewal of technical cadres, as well as knowledge management, utilization of experience, creation of working tables, lack of national and international interaction and recruitment of young talents and poor culture of payment of the user by sanitation services.

Added to the above is important to note that there is a lack of public policy in the development of national technology in this field.

As a result, dependence on foreign technology is observed, which translates into import processes, equipment, software and technology services to the detriment of the national science and technology sector, which are not necessarily adapted technologies to the conditions of Mexico to contribute in solving the problem.

Under such circumstances, to confront the great challenges in the field of integrated water management are stated and pretend that they would be properly processed by municipalities and states (Mexico case) emerges as a very long-term challenge since problems relating to water generally require immediate solutions due to strategic feature of the subject for the production of health, social and economic conditions of the contry.

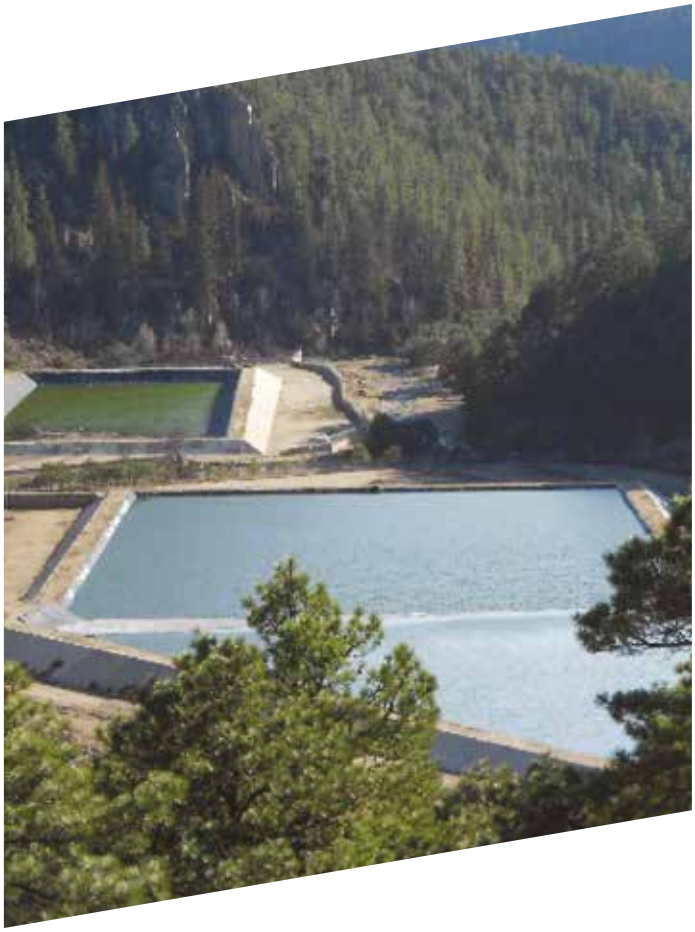
Under this environment, democratic decentralization in the management of water becomes utopian; to solve the problems facing the sector, at least in the short-term centralization and concentration of "water" subject is necessary in general and particularly in regards to wastewater treatment.

In this sense, an emergency action plan is conceptually proposed which has as axis the creation of a national regulator entity which entails the adaptation and / or modification of the legal framework under which the federation with States and Municipalities and the promulgation of related water management as a fundamental strategic subject through a well-defined public policy on the matter.

7. Which are the most appropriate criteria for selecting a technology?

We can conceive decentralized plants from the smallest possible unit which would be a plant for a household room to medium plants that provide services to populations of 100,000 inhabitants. What is the best? a large plant or several small? To answer this question we must undertake a study under the project specific conditions (it is not possible to enter the field of generalizations) by relying under the methodology of a life-cycle analysis (determination of environmental impacts) together with an economic feasibility study. A large plant project for economy of scale reduces the input requirements and attention and investment in the plant itself, although the necessary investment should not be left out for the collection and conveyance of wastewater to the plant that also involves GHG emissions, and neither the transport of supplies and byproducts into and out of the plant. In contrast, small plants, demand greater investment and maintenance, but this can be compensated with the proximity of wastewater source which prevents construction of drainage and disposal collector and the nearest available WWTP byproducts is favored.

> *"A technology tends to be sustainable when in design and features consider the less use of inputs and energy as possible and when is properly adapted to social and economic conditions of surrounding environment."*



In this context we must ask what happens to excessively decentralized plants. That is, for a house, room or plants for serving a small number of residential homes? The most important point here is that served population in this case must attend to the plant since they are not specialists in it (in the case of secondary treatment plants), in addition they must come into contact with the waste and by-products generated by the plant (biogas, odors, sludge and not entirely treated water) for final disposal risking their health.

It is said about the use of dry toilets, combined in the best case, with anaerobic digesters for the degradation of organic matter.

In such cases we must foresee the management and transportation of waste (feces) to the digester and the disposal of sludge from the digester with consequent health risks. Furthermore, if the anaerobic digester does not have a burner biogas, methane (one of the most potent GHGs) generated in the anaerobic digestion is being emitted into the atmosphere which does not favor climate change mitigation.

Even in a context of lack of financial resources, I consider countries should focus their efforts to develop modern sanitation infrastructure (much better if it is own national technology) and widely tested within the framework to recognize the strategic of water management for health and the country development. I think if the subject of water is strategic, there must be financial resources to assist it.

Dry Ecologícoa bathroom , Sumaj Huasi

REGULATION FOR DECENTRALIZED SUSTAINABLE SANITATION

José Luis Aramayo M.
NODE-SNV Project Consultant

Decentralized Sustainable Sanitation, a strategy that requires regulation

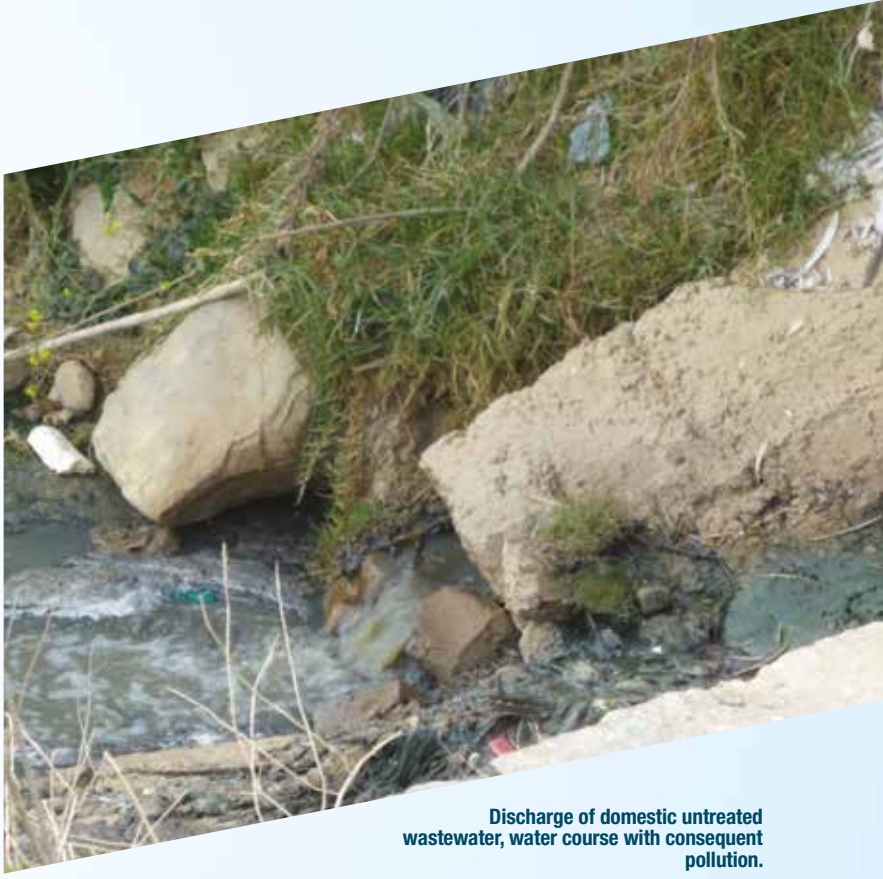
The current policy of Multinational State of Bolivia defined in the National Basic Sanitation Plan (PNSB) 2008-2015, the objective to "improve and expand the Sustainable Sanitation Services, based on the Human Right to Water and Sanitation" according to the Government's commitment to the philosophy of change to Live Well the whole population.

In this context, Decentralized Sustainable[1] Sanitation (DSS) is considered as an option based on the concept of "ecological sanitation" which integral vision addresses reincorporation of nutrients to natural cycles in which treated wastewater and human excreta (safe fertilizer) are not considered as waste, but as reusable organic resources.

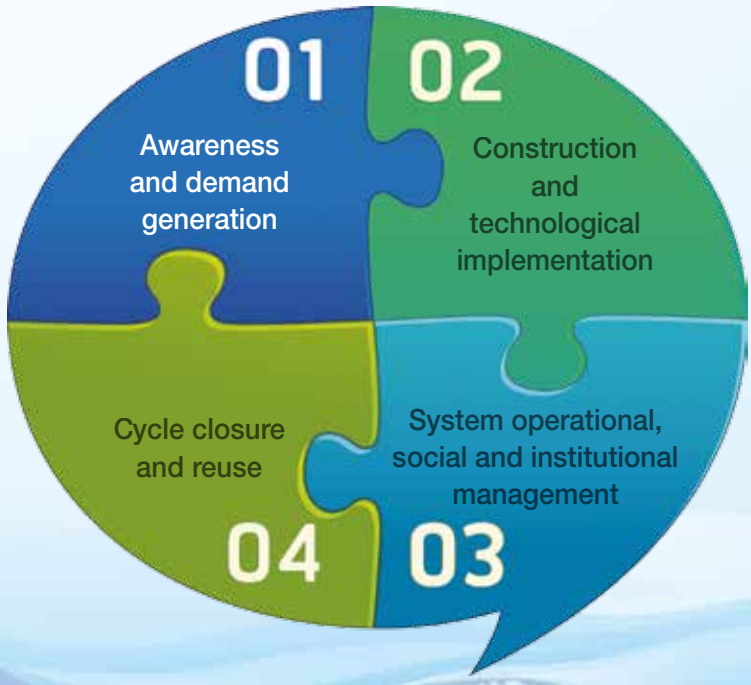
1 The concept of sustainability is broad and also refers to environmental sustainability in the perspective of the negative effects causing an accelerated process of reduction of water sources as a result of climate change and growing demand. Decentralized Sustainable Sanitation systems stand out for the minimum and effective use of water resources.

"Decentralized Sustainable Sanitation uses the basic principles of nature look for closing of water cycles and nutrients, applying modern, Sustainable and safe technologies for the environment and consequently to human health". RAR AAPS Nº227/2010, December 3rd., 2010.

This system (DSS) is characterized by being oriented towards integrated management based on principles of self-determination and self-regulation (subsidiarity) in terms of planning, investment, operation and maintenance, and reuse to subnational entities and/or service users, thus it ensures financial technical and institutional, economic and financial feasibility. The components to be developed for the adoption and implementation of Decentralized Sustainable Sanitation are:



Discharge of domestic untreated wastewater, water course with consequent pollution.



"Decentralized Sustainable Sanitation systems are collection, transport and fecal sludge treatment, Ecological Dry Toilets and Decentralized Wastewater treatment plants these are implemented by different EPSA nationwide with an integrated approach to DSS"

Decentralized Sustainable Sanitation as part of EPSA services

The entities responsible for the provision of potable water and sewerage service in the country are EPSA, constituted as legal entities regularized by the Authority of Supervision and Social Control of Water and Sanitation (AAPS). The aim of EPSA is to ensure the quality, quantity and continuity of potable water and sewerage that users receive.

Given the mission of EPSA - considering the challenge of universality in coverage, limitations of conventional systems and the advantages of alternative sanitation systems (DSS) – since a while several projects with ecological systems have been implemented as an effective and realistic option to achieve the goal of 100% coverage in sanitation, stated in the Patriotic Agenda 2025.

Decentralized Sustainable Sanitation systems are developed through the Ecological Dry Toilets and Decentralized Wastewater Treatment Plants.

These systems could be implemented in different EPSA nationwide, and thus achieve the expansion of sanitation services, reducing open defecation, mitigating the effects of climate change, reducing the quantity of water used and the contamination of water bodies by direct discharges of wastewater and fecal sludge, etc.

Ecological Dry Bath , Sumaj Huasi Achoalla

Collection system , Sumaj Huasi El Alto

Water treatment plant, AGUATUYA, Cochabamba

Regulation for Decentralized Sustainable Sanitation services

Under the Supreme Decree No. 071, the Executive Organ created the Authority of Supervision and Social Control of Water and Sanitation (AAPS), as decentralized technical public institution with autonomy of administrative, financial, legal and technical management. AAPS has the attribution to supervise, monitor, control and regulate the activities of drinking water and basic sanitation, considering Law No. 2066 of April 11, 2000, Law 2878 of October 8, 2004 and its regulations.

AAPS, within the framework of its roles and functions, has initiated control, supervision and monitoring of activities related to the provision of DSS (collection, transportation and treatment of fecal sludge[1], Ecological Dry toilets and Treatment Plants Decentralized Wastewater) for the purpose that the expansion of services undertaking EPSA meet the criteria of the Decentralized Sustainable Sanitation and good services rendered to the population with quality and continuity in preserving human health and environment.

1 RAR AAPS Nº 227/2010 of December 3, 2010, regularizes and regulates the operation of the companies of collecting and transporting sludge - ERTL.

CONSTRUYENDO MÁS ESPERANZAS PARA + VIDAS

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INTERVIEW TO SONIA BARRIOS:

ECOLOGICAL SANITATION, AN IMPORTANT OPTION AGAINST ENVIRONMENTAL POLLUTION

Interviewed by Sol Bagur
NODE SNV Project Consultant

***Sonia Barrios** is a teacher of Biology and Geography at School of Teacher Education "Juan Misael Saracho" in Tarija - Bolivia. Currently she is committed and works for the ecological and environmental sanitation.*

1. Why do you consider ecological sanitation is important in the context of academic research?

Ecological sanitation is very important in academic education to students because it provides a clear alternative to which involves environmental pollution. It is important to consider this subject from the viewpoint of education, even from the start of learning in children and thus think of a better future for them.

2. Which are the main programs or academic areas with more experience in sanitation?

Biology and geography are the specialties of the school "Juan Misael Saracho" (Tarija) the most committed to the activities of ecological and environmental sanitation. Also, students of the specialties of physics, chemistry and mathematics have made a real engagement with the subject of sanitation.

3. What kind of academic research is currently being developed in relation to sanitation?

In the **"Juan Misael Saracho"** School we do research. Students identify environmental sanitation problems, show possible expectations of how to fix these problems, and at the same time are thoughtful and critical to propose the best solutions. We promote many activities in relation to the subject, such as reforestation in very dry areas deprived of vegetation, fertilizer production not only of feces, but also fertilizer by compost of organic bacteria.

On the other hand, we have registered experiences in production of materials from solid recycling materials disused, from the use of bottles, and so we are trying to build a greenhouse to achieve strengthen agriculture activities.

4. What kind of partnerships do you think will allow better treatment and sanitation development at the academic level?

The most important alliances for us are interagency partnerships since we are aware that the most important factor we miss in education are technical and economic. Thus, for example, Decentralized Sustainable Sanitation Node has not only helped us with the construction of an ecological toilet but rather at the same time, it has given us the opportunity to transmit knowledge from a real object that is working in our institution.

"Students identify environmental sanitation problems, show possible expectations of how to solve these problems and at the same time, are reflective and critical to propose the best solutions."

5. What are the main barriers or obstacles at academic level that hinder research and further development on the subject of sanitation?

In my experience I think we still have a greater commitment to the issue. There are still many mental schemes that prevent a true adaptation and knowledge of new proposals concerning on environment subject and, specifically on sanitation. Many obstacles imposed by the students believe themselves that the products used in dry toilets generate major diseases. In this regard, we are working with other students who support us to transmit and replicate clear and accurate information.

6. Do you think that a scholarship program would imply a positive choice? Why?

I consider it a fascinating option because they often have really interesting ideas but they cannot be put into practice by certain economic impediments. Scholarships would help many students to strengthening knowledge and to achieve more and better results of our research.

7. Which areas, subjects or fields do you considered need to be mostly investigated and / or developed in sanitation?

Largely I think the maintenance of the sewerage system should be a more addressed topic, while the sewage is still used but there is no real sustainability of this system. Another issue is food production from organic materials and the need to avoid the use of chemicals that somehow also damage health.

OUR PUBLICATIONS
NODE PROJECT 2014

Strategic tools for Ecological Dry Toilets: Parameterization of scenarios in sanitation chain

Description: The document is addressing to instances with making decisions capacity (public and private) and sanitation and specialized technical staff. It is a methodological proposal for the planning of Ecological Sanitation systems, from the perspective of its design and implementation along the entire chain of sanitation technology of Ecological Dry Toilets, reuse and closing of nutrient cycling.

Meeting of Experiences in Decentralized Sustainable Sanitation

Description: It is the systematization of the Meeting of Experiences in Decentralized Sustainable Sanitation, which was attended by various experts both nationally and internationally who presented technical, institutional and social experiences in the perspective of Decentralized Sustainable Sanitation.

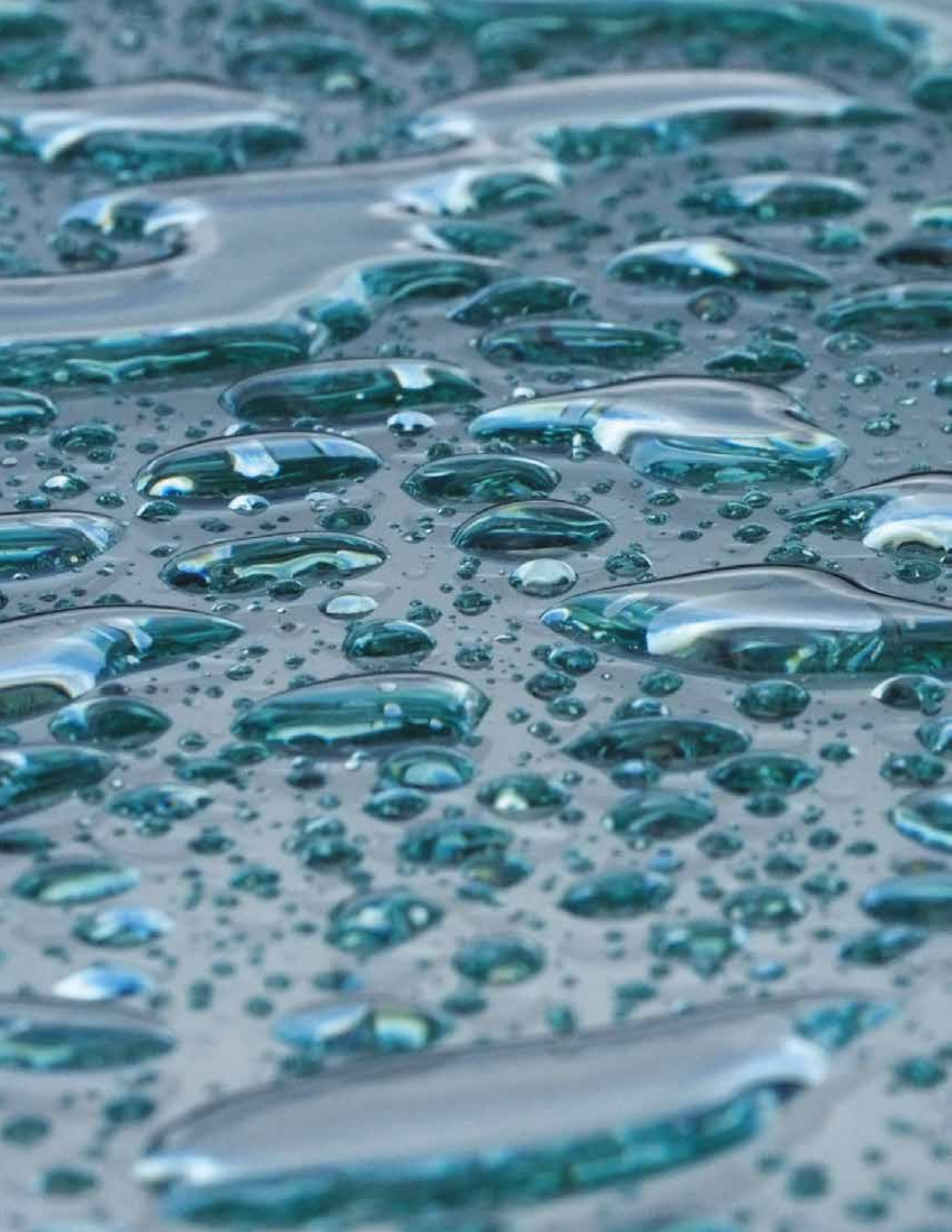
Participatory sanitation: Experience of Water for People within the framework of NODE Decentralized Sustainable Sanitation Project 2012-2013

Description: This work systematizes the experience of Water For People in building Ecological Dry Toilets in the cities of Riberalta (Beni) and Santa Cruz, where a seed was sown in mobilizing action areas of the project, with favorable results for their own entrepreneurs, that is for the people who actively participated in the actions planned.

Strengthening workshop

On research capability and dissemination of knowledge on Decentralized Sustainable Sanitation. Event Summary

Description: The aim of the event was to strengthen institutional partnerships aimed at strengthening support actions for research on Ecological Sanitation that promotes NODE project, articulated with academic programs of universities, aimed at supporting studies of accredited researchers, research of graduate students and postgraduate students; also technically operators.



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Project: Decentralized Sustainable Sanitation NODE as Knowledge Platform and Impact Generation on Sustainable Solutions 2012-2016