Reuso

SUSTAINABLE SANITATION, ORGANIC SOLUTIONS

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

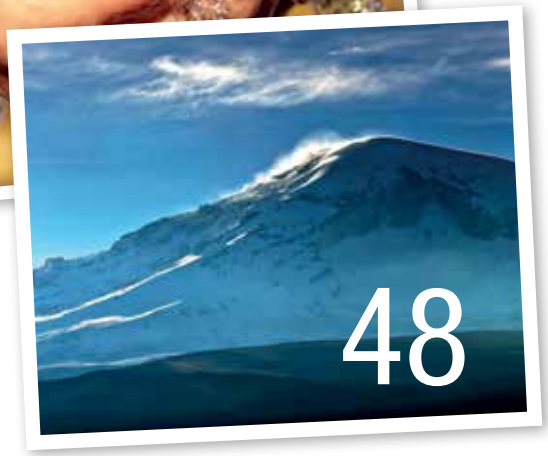
¡Technology!!

Water, Sanitation and Healthy Housing

[ecological Achocalla]

Toilets dry

Decentralized NODE Sustainable Sanitation Project



Reusso
SANEAMIENTO SOSTENIBLE, SOLUCIONES ECOLÓGICAS

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NODO of Decentralized Sustainable Sanitation as a Platform of Decentralized Knowledge Generation and Impact on Sustainable Solutions Project

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SNV

NODO DE CONOCIMIENTO EN SANEAMIENTO SOSTENIBLE DESCENTRALIZADO

SUECIA

CONTENT

EDITORIAL

Reusso is a practical magazine that summarizes the knowledge and experience developed in ecological sanitation in various Bolivian institutions that make up the Decentralized Knowledge NODE on Sustainable Sanitation. It is a tool for the dissemination of Sustainable Sanitation Node Project as a Platform of Decentralized Knowledge Generation and Impact on Sustainable Solutions, funded by the Embassy of Sweden.

This monthly diffusion new proposal, from its first issue, aims to share with you, our loyal reader, articles of research, training, management, short communications, abstracts of theses, innovation, book reviews and notes on interesting events. It is an innovative alternative on advances and applications of ecological sanitation in the country to promote the exploitation of reuse resources as a result of water treatment systems and organic waste and to promote the exchange of information and knowledge from different stakeholders involved in the provision of sanitation.

It also offers the opportunity to post technological experiences on ecological sanitation, particularly to those who work with these topics in suburban areas, with population without any with access to sanitation, and are interested in deepening with information regarding decentralized sanitation systems, by applying Sanitation Modules or Ecological Dry Toilets; or through Wastewater Treatment Plants installed with own semi-decentralized technologies.

Reusso, is a specialized magazine that aims to generate opinion about ecological sanitation and promote this approach as a valuable option in our environment, where you can clearly be part of this initiative.

I predict that this new specialized and free distribution magazine puts in the contribution in the field of sustainable decentralized sanitation in Bolivia and increasingly open spaces for analysis, research and exchange of experiences, focusing on knowledge generation.

Jorge Julio Garrett Kent

SNV-Bolivia Country Director

INTERVIEW WITH

EMMA QUIROGA

GENERAL EXECUTIVE DIRECTOR OF SENASBA

DRY TOILET, AN INNOVATIVE TECHNOLOGY CHOICE IN THE PERSPECTIVE OF CLIMATE CHANGE

Interviewed by Brenda Pardo
Editor REUSSO – SNV magazine

Dr. Emma General Quiroga is Executive Director of the National Service for Sustainability in Water and Sanitation (SENASBA), among some of her activities, focuses efforts seeking to promote public policies for the development of ecological sanitation as an option in the country.

Inside the goals set by the Agenda 2025, can be found to reach universality of services, both water and sanitation, this means reaching coverage of 100%, in the case of sanitation, up to date is by nearly half.

On this view, among options on ecological sanitation is the implementation of a technology called Eco Dry Toilet (EDT).

With the purpose of learning more about the work performed by SENASBA in this field, a short interview was conducted which begins thus:

1. Lately, effects of climate change are seen more frequently and drama in the world, in this context what dry toilet means?

The dry toilet is a technological option to separate solid and liquid waste (feces and urine), with technical advantages based on odor and environmental protection. This Eco Dry Toilet is the alternative to remove excreta differently, without using water.

"We are forced to consider which alternatives apply, which must be generated and which must be re-used and promoted to adapt to a situation of more water stress".

2. Why the need to implement a dry toilet?

Dry water in the area is still a new alternative, but for the country is very important to implement, mainly due to the effects of climate change that the world is going through. Therefore, we are forced to consider which alternatives apply, which must be generated and which must be re-used and promoted to adapt to a situation of more water stress, particularly in some areas than others; in this case, the dry toilet is a technological option and we expect and are confident somehow that it is an answer to this phenomenon.

3. Which are the factors to be taken into account for its construction?

As SENASBA we are in a rural program, and we have precisely the purpose of self-construction of dry toilets. We have found problems mainly with construction firms, both for water and for sanitation, they know very little about the rules and the promoted and defined design in the regulations from the Vice Ministry of Potable Water and Basic Sanitation. This caused us problems so that people can contribute; in our opinion, it is very important to promote in rural areas to reach ownership and empowerment regarding their use and the meaning of having these dry toilets.4. ¿Este tipo de baño puede ser construido en zonas rurales como peri urbanas?

4. ¿This sort of toilet can be built both in rural and suburban areas?

We have seen experiences of dry toilets built in suburban areas that work very well, and experiences that have been built in rural areas; then, it has no limitation of geographic area or population level; obviously it has nuances or additional actions that depend on the area and have to be focused and strengthened. For suburban areas, disposal of waste is an issue that we have to work in a higher degree unlike the rural area, which is not necessarily a serious problem.

5. What are the guidelines and regulations that are working in SENASBA?

We are currently working on community development focusing on sanitation and -in this case- with a focus on ecological sanitation. As a government institution under the Ministry of Environment and Water, we have taken all the instruments that governing body has generated; and found that there are very few operational instruments from the central level to prevent these technologies can socialize with people, but there are experiences of other actors such as NGOs, who have delved more into methodologies to make more feasible this social process.

Currently, there have been changes to the social sector strategy in populations under 2,000 inhabitants. The process of support in the self-construction of health module is also a point that we still have to work with greater rigor, on awareness and training of population for the disposal of waste, the use of urine and buried the feces into remote rural areas. This is incorporated in our work, generated instruments to be carried out, but we understand that we are still in a stage where we need to improve.

6. I have understood that SENASBA is counterpart of SNV What kind of work is being carried out jointly by the two institutions?

We have a more ambitious agenda with SNV this year, it does not mean that we haven't work with them previously, but we have set ourselves targets primarily towards ecological sanitation and decentralized sanitation, as innovative technology options since they are very attractive and important for the achievement of our institutional functions and results. From there, we signed an agreement with SNV, with a common purpose, which is to make services truly meet the mandate of the human right to water and sanitation, but also be sustainable. So, this point of agreement invited us to generate an agenda operatively greater which we predict and we are working together to meet successes.

7. What do you think about the Meeting of Experiences in Sustainable Decentralized Sanitation?

This sector needs reflection spaces to help us rethink our policies and ways to reach the 2025 target set over the country in water and sanitation. Exploring technologies and methodologies becomes necessary for us to be more efficient and also relevant to communities, municipalities and departmental governments.

Through this kind of meetings, we expect to yield insight into the issues to certain questions yet, and we can establish which path or paths that we must continue to strengthen innovation in the sanitation sector.

Thus, we conclude the interview with Dr. Emma Quiroga, Executive General Director of SENASBA, whom we ask for a closing message, and answer us:

"As SENASBA, we are convinced that it will be much longer the way to reach the 2025 goal if we do not work on incorporating adequate technology and innovation, appropriate for the country, both for water and sanitation primarily".

As SENASBA, we are convinced that it will be much longer the way to reach the 2025 goal if we do not work on incorporating adequate technology and innovation, appropriate for the country, both for water and sanitation primarily, and if it is not accompanied with the development of local institutional capacities and aimed at people and sector professionals.

We need to allocate and invest more in the lines of work, because it will not be possible to reach the goal if it is not accompanied by resources to investment in research, for training, vocational preparation and institutional development of local entities, such as municipal and departmental governments and EPSA; they are the focal points of our work and we want to have more partners like SNV and other stakeholders who can contribute not only financially but professionally, because they are very important for our development and for achieving compliance with the human right to water and sanitation in the country.

"NODO" PROJECT OUTCOMES

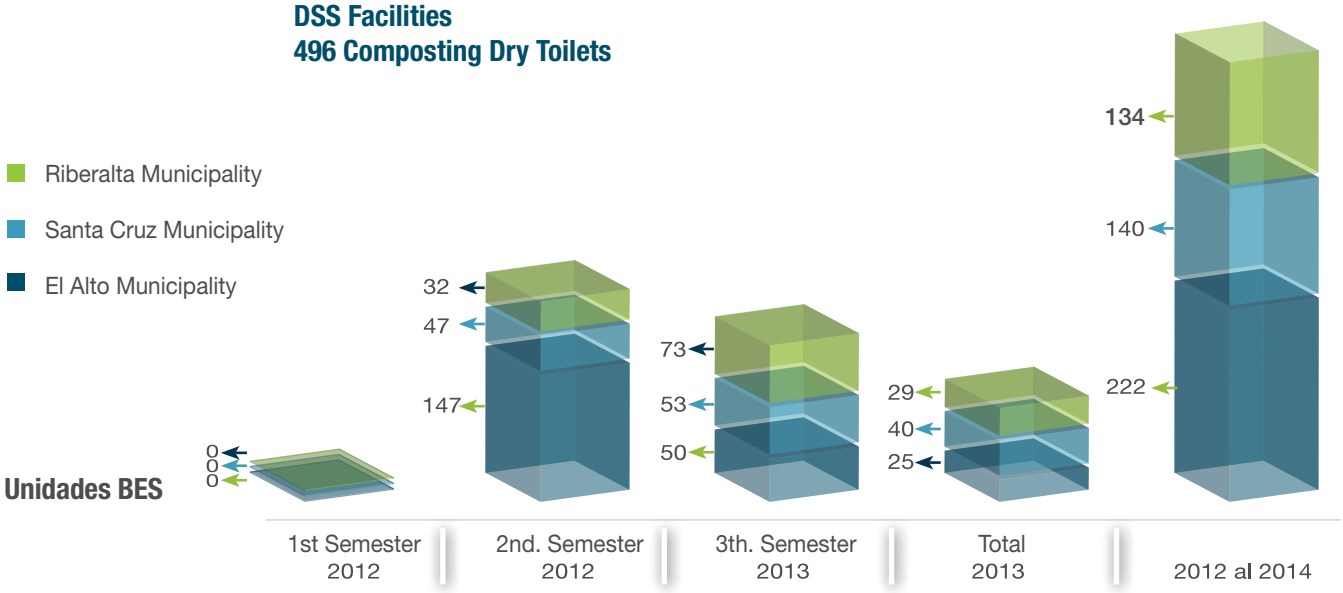
REGARDING COVERAGE OF DRY COMPOSTING TOILETS AND MODULES WTP-D

Henry Morales M.
Project NODE-SNV Consultant

The Project Decentralized Sustainable Sanitation Node as a Platform for Knowledge and Sustainable Solutions Impact Generation performance, from the follow-up system, monitoring and evaluation, is valued under a combination of qualitative and quantitative indicators, which measure – above all - results and effects in relation to annual objectives and overall goals, which are defined by the logical framework of the Project.

By observing only quantitative indicators in the years 2012, 2013 and part of 2014, works that have been delivered and have benefited different families in the municipalities of El Alto, Santa Cruz, Riberalta and Cliza, have not only been evidence of compliance of the Project, but rather they are contributing to the national coverage today represents a real challenge and requires commitment and input from all institutions involved in the sector.

DSS Facilities
496 Composting Dry Toilets



496

families have access to sanitation facilities (composting dry toilets built and running) as well as 529 additional works implemented

As detailed in graphic "DSS facilities" up to December 31, 2013, a total of 75 new families reported access to family ecological sanitary units in the suburban area of District 7 and 14 of the Municipality of El Alto.

Modules represent not only infrastructure but families trained in the operation and maintenance of the DCTs, thanks to the actions taken by Sumaj Huasi Foundation. With these interventions, the Foundation achieved a total of 222 family health modules as part of their participation during these years of work and support to El Alto population.

Due to the mode of financing, user families of technologies have contributed to 50% of the cost of health modules, they have also contributed with the payment of Bs.10 monthly, to the liquid and solid pickup system of ecological dry toilets, contributing, in this way, the scheme of financial sustainability and sanitation closing cycle.

As for the municipalities of Santa Cruz and Riberalta, they have been benefited during 2013 with 93 and 102 DCTs respectively, due to the outcomes achieved by Water For People a Non-Governmental Organization, which through the Project financing, managed that a total of 274 families have access to sanitation facilities (composting toilets built) in 2012 and 2013, as well as implementing 539 additional works, defined as sheds, laundry, water wells, washrooms, gardeners filters and absorption wells; with quality of work and social process specifically in suburban areas of Santa Cruz and Riberalta.

Additionally, Project reports in the municipality of Montero, the achievement of demonstration works completed in a total of 8 Dry Composting Toilets in 2014 thereof including solar chamber, bench type toilets with dual chamber and implementation of 8 additional works consisting of gardeners bio filters specifically for gray water (soapy water).

Up to December 31, 2013, a total of 75 new families reported access to family ecological sanitary units in the suburban area of District 7 and 14 of the Municipality of El Alto

By 2014, the Project is aimed at consolidating and expanding the system processes started with Decentralized Sustainable Sanitation (SSD), during Phase, beginning with 30 DCTs in Santa Cruz (Los Pinos, La Madrid, Esperanza, Regreso, and Agroinco) and 15 Riberalta (Media Luna, Vaca Diez, 11 de Octubre, 2 de Mayo y Palmar).

As for Wastewater Treatment Plants there are three modules in WTPs Cliza "Phase II". Such modules were 100% implemented, under the leadership of AGUATUYA Foundation. The delivery was made on December 27, 2013 and the operational and performance phase is expected to be also conducted during 2014. AGUATUYA will monitor the Plant during operation.

While readjusting Retamas WTP is 60%, for 2013, the scope and goals of it was fully agreed with the beneficiary families, communities and municipal public stakeholders involved in this Project. Also, AGUATUYA Foundation, implemented the communication and awareness strategy with multiple local stakeholders that accompanied the construction process. This has been agreed locally and has the support of families, communities and local government bodies, such as the counterpart contribution from the Municipal Government of Cliza of USD. 165,000 based on the premises where the plant was built for building modules Wastewater Treatment Plant.

In overall, the NODE-SNV Project with funding from the Swedish Embassy is contributing to 6,480 Bolivian men and women improve their sanitation and hygiene and have healthy housing.

FUNDACIÓN SUMAJ HUASI
"Para la Vivienda Saludable"




La Fundación Sumaj Huasi "Para la Vivienda Saludable", es una entidad sin fines de lucro, creada con la finalidad de dar respuesta a los múltiples problemas generados por la pobreza en Bolivia y otros paises en vías de desarrollo.

MISIÓN
Mejorar las condiciones de vida, salud y el entorno ambiental de las poblaciones más necesitadas, mediante el desarrollo aplicación y difusión de tecnologías y metodologías alternativas en agua, saneamiento y medio ambiente, teniendo como eje el concepto de Vivienda Saludable.

VISIÓN
Un mundo donde las personas más necesitadas tengan una vida en condiciones dignas, equitativas y autosostenibles.

Sumaj Huasi brinda asistencia técnica y desarrolla proyectos en agua, saneamiento y la Vivienda Saludable con tecnologías y metodologías alternativas.

Las áreas de intervención son: **ABASTECIMIENTO DE AGUA, CALIDAD DEL AGUA Y SU TRATAMIENTO, SANEAMIENTO E HIGIENE, AHORRO ENERGÉTICO, SEGURIDAD ALIMENTARIA, CAPACITACIÓN GRUPAL Y A NIVEL FAMILIAR**

CENTRO DE TRANSFERENCIA DE TECNOLOGÍAS

MISIÓN
Formar recursos humanos con sólidos conocimientos teóricos y prácticos que permitan impulsar el desarrollo sostenible a nivel local, nacional y regional mediante la aplicación de metodologías y tecnologías alternativas tomando como eje el concepto de Vivienda Saludable.

VISIÓN
Ser un centro de capacitación líder en la formación de personal altamente calificado y comprometido con un desarrollo equitativo, sostenible y equilibrado entre los seres humanos y la naturaleza

CAPACITACIÓN EN:
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MODALIDAD:
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THE LATEST TRENOS IN WEB

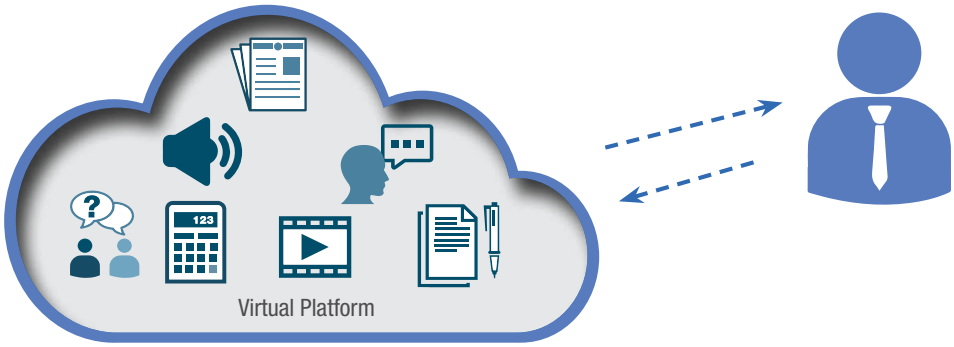
Cristian Marcelo Cadena López
Consultant NODO – SNV Project

"The sky is the limit to get an attractive, strong and mainly functional platform".

Often and with growing technological advances being generated new concepts are available to users. A concept is the use of web platforms or virtual platforms, all within the world of Internet technology.

Usually, we conceived the concept of platform using an approach of representation of a holder to some type of structure. In this case, the concept works in the same way, a web or a virtual platform is a system that supports, or is based on different types of web applications to be used by our users.

FIGURE 1
VIRTUAL PLATFORM



Source: owner

Among these applications there are a variety of formats and functionalities. Currently, media formats are widely used, such as forums, web blogs, video blogs, webinars, chat rooms, support for e-learning, etc.

For example, we can mention the case of the virtual platform of the Decentralized Sustainable Sanitation Node as a Platform for Knowledge and Sustainable Solutions Impact Generation of SNV Netherlands Development Organisation (SNV) in Bolivia.

This page includes (at left as shown in the Illustration # 2), functional modules are fundamental components of the portal.

FIGURE 2
INITIAL SITE WWW.ANESBVI-NSSD-BOLIVIA.ORG

Source: Web Site www.anesbvi-nssd-bolivia.org

As shown in Fig.2, this web system has some tools which allow an interaction with the target user in different ways. Four of the main modules of this versatile platform are:

- **Virtual room:** This application allows the connection of up to 100 people at a time to attend a virtual meeting. Webinars (online seminars) are developed on this tool and it represents a powerful way to reach more people using the Internet as communication media.
- **Virtual classroom:** It has a tool called "moodle" which is used for e-learning, ie, online training, and is regarded as one of the most requested tools on the web for virtual training. The virtual classroom is considered as an educational environment where they can manage all kinds of courses. Also, it is known as LCMS (Learning Content Management System).
- **Image gallery:** the image gallery application is very common in web pages. In this type of application photographs and images organized into photo albums are included, so that the target user may have access to important graphical information and/or to view activities disseminated through this media.
- **Video gallery (Videos):** a video module, like its predecessor, has the purpose of displaying information in audiovisual format. This information (videos) are usually uploaded to an area that interacts with the largest social network of Web videos: YouTube and thus, you can get a tool for continuous interaction with the target user via these social networks.

FIGURE 3
IMAGE GALLERY WWW.ANESBVI-NSSD-BOLIVIA.ORG
Source: Web Site www.anesbvi-nssd-bolivia.org

A

WEB 2.0 SITE

allows users to interact and collaborate with each other as content creators generated by users in a virtual community.

Currently, Web systems, also tend to handle Web 2.0 technology, which enables sharing the same information with a design focused on ease of use for the user and larger interaction with social networks like Facebook and Twitter.

The visual appearance of the web platform has significant additional value. The trend in web pages works more closely with the graphic image and typography (attractive to the user font types). An attractive visual appearance is one of the main ways to get the user visits and interacts with the platform, reason why the interface or facing the surfer must be attractive and intuitive, allowing the navigation very simple and the information and/ or applications to be found immediately.

When developing or acquiring a virtual platform must be defined in the first instance, needs of the institution to disseminate information and reach certain goals with their users. Recently, as of this moment, it is feasible to incorporate the different tools to the virtual platform and it is always important to understand that “The sky is the limit” to get an attractive, strong and mainly functional platform.

ESTADO PLURINACIONAL DE BOLIVIA

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AAPS

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Oficina Regional Tarija: Calle 15 de Abril Nº 526 entre Isaac Attie y Junín. Teléfono 71861040.

Oficina Regional Cochabamba: Calle Luis Castel Quiroga Nº1450 entre Avenida Presidente Manuel Isidoro Belzu y Jose Pol - Teléfono (4)4660320. Zona Muyurina.

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SUMAJ HUASI TRANSFERS EXPERIENCES ON:

WATER, SANITATION AND HEALTHY HOUSING THROUGH THE CENTER OF TECHNOLOGIES TRANSFER ES

Oscar Suntura Yujra
Executive Director
Sumaj Huasi Foundation "For healthy housing"

Over recent years, we have worked on validating new strategies and intervention models, mainly in Ecological Sanitation under a production approach as a measure of adaptation to Climate Change in coordination with the Ministry of Environment and Water, the Vice-Ministry of Drinking Water and Basic Sanitation and by support of the Embassy of Sweden, through the Decentralized Sustainable Sanitation NODE.

Model includes the implementation of a collection, transportation and treatment of waste system ECOSAN, by which safe organic fertilizers are obtained to be used on crops, closing the sanitation nutrient cycle. A Center for Technology Transfer (CTT-FSH) has been

DETAILS OF THE WORKSHOP MODULES:

MODULE 1

Environment and Climate Change. Sectorial regulations in force (Technical and DESCOM)

- Environment and Climate Change (reduce, recycle and reuse).
- Legal framework and regulations in force.
- Life, land and territory (Mother Earth).

MODULE 2

Alternative technologies as a measure of adaptation to Climate Change

- Alternative technologies for water supply.
- Techniques for improving the quality of water for human consumption.
- Water quality analysis.
- Water safety Plans.
- Domestic water decentralized handling.

built and equipped in its first phase, as part of the sustainability strategy and knowledge transfer.

CTT – FSH, has the mission, to develop human resources with strong knowledge to boost regional and national development, using alternative technologies that respond to social and technical environment. It provides training in Environmental Sanitation, Production Development, Health and Environmental Design, Implementation and Evaluation of Sustainable Initiatives, modalities of the course are attendance (experiential), blended learning and virtual

Between 2013 and 2014, a large number of technical personnel from the municipal and departmental governments, independent professionals, students, representatives of sectorial organizations and civil society have been trained. Workshops were called “Alternative Technologies for Water, Sanitation and Healthy Housing, as a measure of adaptation to Climate Change” where lessons learned from the project “Expanding Coverage on Decentralized Sustainable Sanitation” with the implementation of eco-

MODULE 3

Ecological Sanitation Services (Technical and DESCOM Component)

- DESCOM (pre-investment, implementation and post Project stages).
- Basis of sustainability in the post project stage with ECOSAN.
- Visit and exchange of knowledge with families using Ecological Sanitation.

MODULE 4

Treatment and use of organic fertilizers in temperate environments and open field

- Foundations for waste treatment.
- Foundations for the application of organic fertilizers in crops.
- Use of ECOSAN solid and liquid manure in opencast crops.
- ECOSAN waste treatment.

MODULE 5

Ecological Sanitation Projects design

- Regulations for Project design and current adjustments.
- Design criteria for sustainable ecological sanitation projects.
- National indicators for water and sanitation and alternative sanitation technologies.
- Communication component.

logical family sanitation modules (MOSAFA-ECO) in suburban areas of El Alto city were spread.

The content of the workshop modules captured the interest of sector professionals across the country; let us remember that the application of ecological sanitation, as well as other technologies in water and housing, has been very successful as measures of adaptation to climate change, generating a huge demand for these services. It's important to route properly such initiatives, it is necessary to transfer this knowledge to decision making levels, technical and general population over the application of these technologies.

Contents were developed by professionals and experts from the Ministry of Environment and Water (MMAyA), the Autonomous Municipal Government of El Alto (GAMEA), "El Alto" Public University (UPEA), Sumaj Huasi Foundation (FSH) and special guests with extensive experience on thematic

For its part, Oscar Suntura, Sumaj Huasi Executive Director, said that the Center for Technology Transfer (CTT-FSH), *aims to empower the national human resource preferably by the transfer of knowledge in ecological sanitation so they can raise alternative and innovative solutions to the consequences of climate change, appropriate to technological and scientific progress, said Suntura.*

> *"CTT–FSH, has the mission, to develop human resources with strong knowledge to boost regional and national development, using alternative technologies that respond to social and technical environment".*

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SANTA CRUZ - BOLIVIA

ESPECIALIDAD

SANEAMIENTO ECOLOGICO Y CAMBIO CLIMÁTICO

Módulos

1. Fundamentos del Saneamiento Sostenible Descentralizado(SSD).
2. Marco Normativo Institucional.
3. El Modelo del SSD en Bolivia.
4. Integridad y Cierre del Ciclo en SSD
5. Estrategia Social.
6. Cambio Climático y SSD.
7. SSD, Segurirad Alimentaria y Desarrollo Rural.
8. Proyectos de Saneamiento Sostenible Descentralizado compatible con el Desarrollo Humano.
9. Gestión Integrada de Recursos Hídricos.

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NODO DE CONOCIMIENTO EN SANEAMIENTO SOSTENIBLE DESCENTRALIZADO

JOINT EFFORTS FOR LIFE QUALITY

Gonzalo Ameller T.
SNV Advisor

The project's goal for this year is to enable

250

people with ecological household sanitation solutions, as a means to achieve "Living Well" with human dignity, health and security.

The NODE Decentralized Sustainable Sanitation Project is innovating with a new model of Dry CompostingToilets, from a camera with solar heater in District 1 of Montero Municipality.

This initiative is possible thanks to the Interagency Cooperation Agreement signed among the SNV Netherlands Development Organisation (SNV BOLIVIA), NODE of Decentralized Knowledge on Sustainable Sanitation and Montero Public Services Cooperative Ltd. COSMOL, which socialize and sensitize on the need for an adequate and friendly system of household sanitation to environment.

The project develops awareness and demand generation for Composting Dry Toilets, provides technical assistance in the construction and supplies key ecological sanitary fittings, and empowers families in the proper use, maintenance and handling of waste, through a multidisciplinary team.

The slogan used to promote the toilets is:

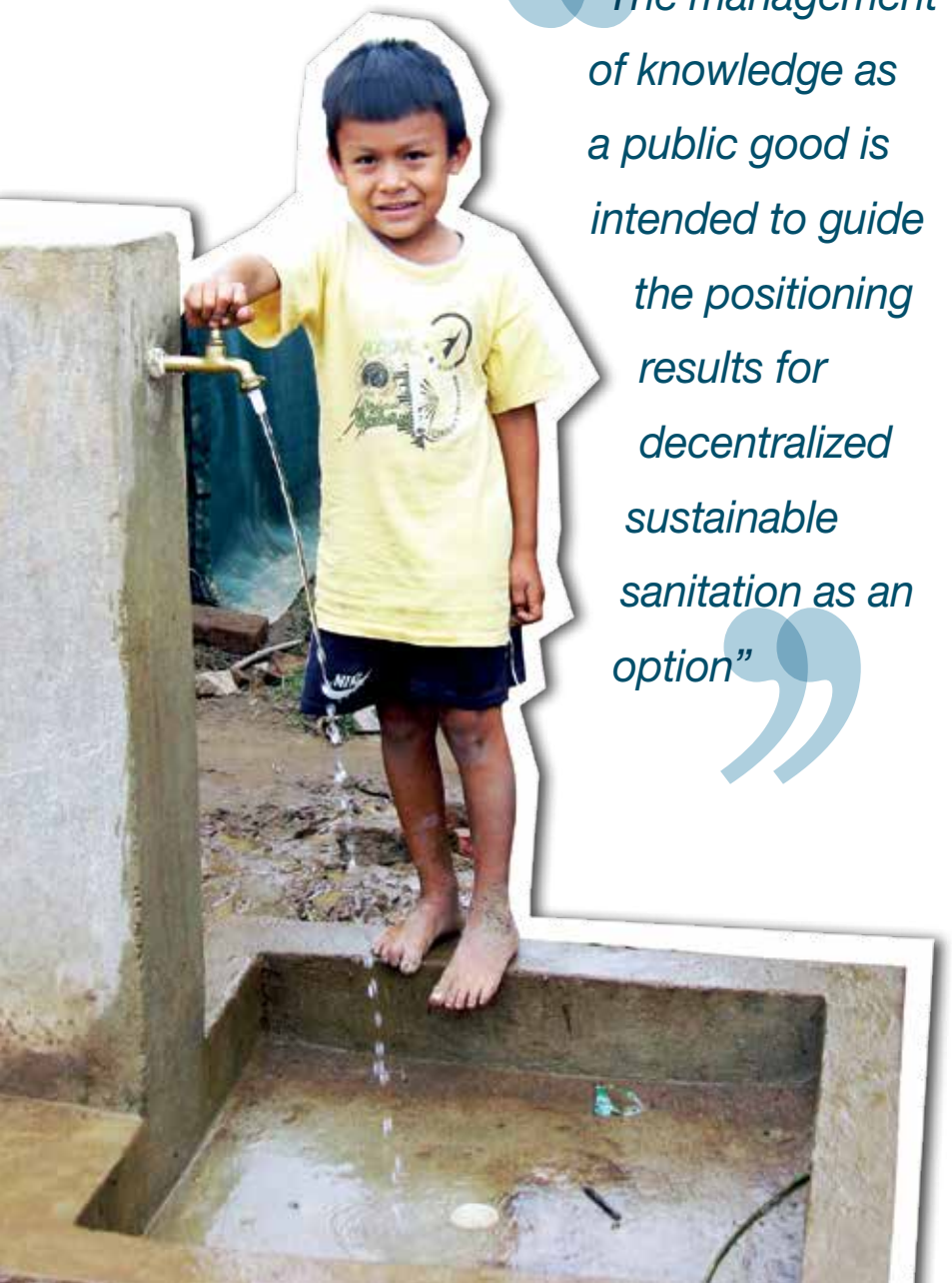
"A toilet at home! My family's health counts!"

The population response has been favorable after the first meetings/ workshops to raise awareness on the hygiene at home, the importance of the water cycle and the Cycle of Nutrients, and on ecological sanitation technology demonstration. More than 25 families have been registered to start the construction and six of them are already in process.

The project's goal for this year is to enable 250 people with ecological household sanitation solutions, as a means to achieve "Living Well" with human dignity, health and security. This initiative is funded by the Embassy of Sweden.

KNOWLEDGE MANAGEMENT ON DECENTRALIZED SUSTAINABLE SANITATION PLATFORM

Mónica Ayala
NODE-SNV Project consultant



"The management of knowledge as a public good is intended to guide the positioning results for decentralized sustainable sanitation as an option"

One of the biggest challenges in water and sanitation agenda in the country, aims to attenuate the percentage gap, in terms of existing coverage between the two services: water (78%) and sanitation (46%). These two are key points in the perspective of the Human Right to Water and Sanitation, rights which are addressed jointly, but their results are different and, in some cases, have favored the increase of water coverage to the detriment of the need for a choice of appropriate and sustainable sanitation.

Bridging the gap in coverage is only a first task, but it is not unique, since the Bolivian agenda raises the universality of services for 2025. Such challenge obliges put a special emphasis on disseminating unconventional options that precisely corresponds to initiative of NODE

Decentralized Sustainable Sanitation Project, that promotes environmentally friendly, accessible and participatory technologies such as sanitation Dry Composting Toilets (DCT) and Decentralized Wastewater Treatment Plants (WWTP-D), through a knowledge network and the node of expert institutions in the sector, to achieve capacity development for the benefit of expanding access to sanitation by the Bolivian population.

Understanding Decentralized Sustainable Sanitation

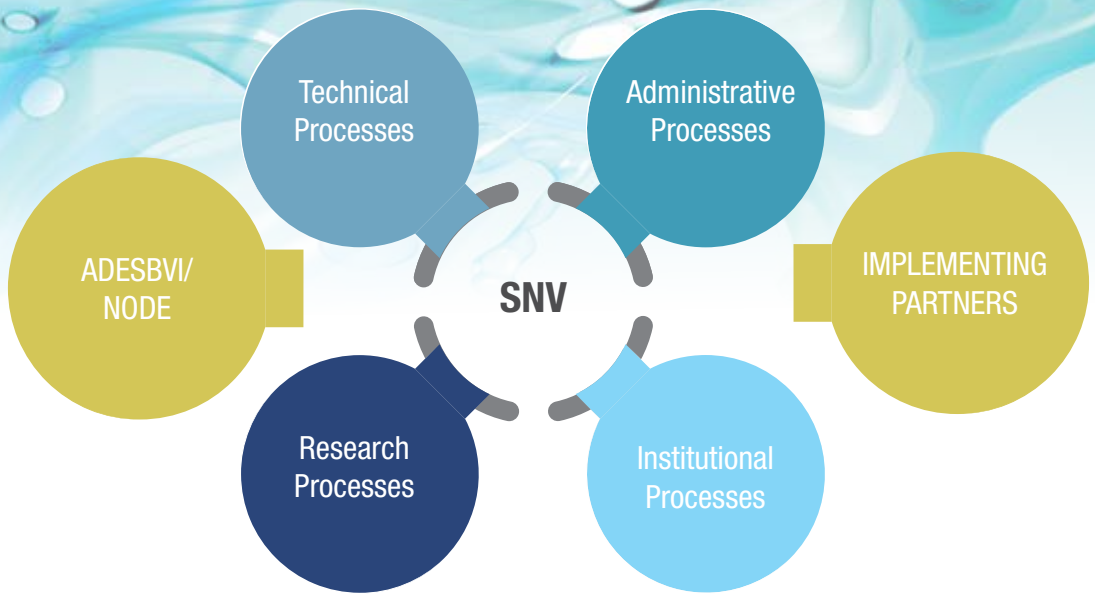
Decentralized Sustainable Sanitation (DSS) is a holistic approach, rather than a purely technical concept[1], is a sanitation system that promotes human health, it does not generate environmental degradation, makes rational use of water resources and returns nutrients to Mother Earth, through an integral approach that addresses from demand generation, appropriation of technology, operation and maintenance, to the reuse of final products.

These systems are characterized by an 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, ensuring the technical, institutional, economic and financial viability.

In this perspective, sustainability and decentralization, combined

1 WWTP Sustainability Holistic Model, Node Project, 2013

Graph 1: Institutional logic of NODE Project



with sanitation, become a holistic approach, seeking the implementation of technologies for innocuous management of human excreta, and both social and economic viability for access to service users, thereby contributing to a favorable impact on the environment.

One of the main principles of this approach is to consider sustainability, both to the excreta as waste water, not as a waste but as a valuable resource to be reused and recycled.

This requires, from the Node Sanitation Project, promoting a management platform as a public good knowledge, promoting greater capabilities, covering from the generation of knowledge and competencies for designing, to the implementation of decentralized sustainable sanitation systems in different areas of Bolivia.

Knowledge Management Platform from the NODE Project

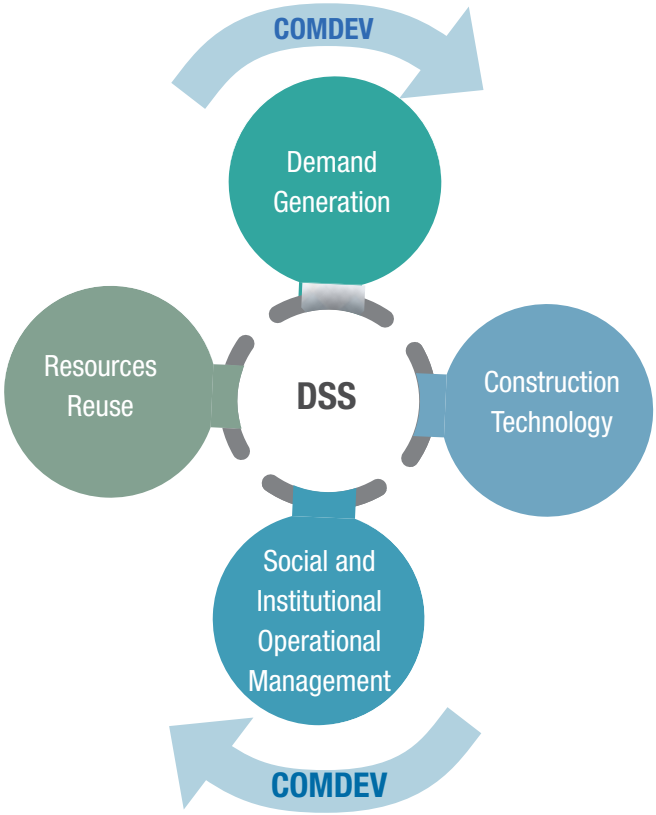
Knowledge management has the goal to transfer knowledge from where it is generated, to the place where it will be used (BA Fuentes, 2019), and involves the development of competencies aimed at achieving a goal or objective.

On this perspective, "knowledge" to DSS as a public good, including an opportunity to make available to the public, private and community stakeholders, knowledge and information generated jointly with implementing partners, such as Sumaj Huasi, Aguatuya and the NGO Water for People.

The main objective is to transfer knowledge and develop competencies related to Models (technology and management) DSS achieved by the Project, from the process generation institutions to the users and implementers of these technologies, thus making it a public good.

For this purpose, it has posed an institutional logic dynamised through different processes namely: Technical, administrative, investigative, innovative and institutional covering activities from generating technical instruments industry, application, design and technology innovation, systematization and development of models of access to DSS, as well as research of models with potential of integral improvements with emphasis on closing the sanitation cycle, and joint public-private key stakeholders through the creation of opportunities for coordination

Graph 2: Decentralized Sustainable Sanitation Approach



Institutional logic of the NODE Project as a platform of knowledge is reflected in Graph 1.

The aforementioned processes operate over five interdependent components such as: awareness and demand management, technology and construction, operational, social and institutional management, reuse of resources and social strategy (adapted COMDEV).

Each of these components has its own features giving reason for the prospect of Decentralized Sustainable Sanitation (DSS). In this perspective, knowledge management as a public good is intended to guide the positioning results of sustainable decentralized sanitation as an option. (Graph 2)

Project activities as a Platform for Knowledge, have been aligned congruently with the scope and purposes of DSS components which are the generators of experiences, information and data are instrumentalized, transfer and provide feedback searching for constant develop of replicable models, contributing to increase coverage and quality of Bolivian population's life.

Experiences in DSS, and its interventions in projects throughout the country are systematized in documents ranging from the regulatory competential analysis, adaptation of social strategy to DSS models, and integral vision of sustainability in Wastewater Treatment Plants.

In this regard, the Platform, through its actions, provides a strategic approach to land -in first instance- concepts from the interior of the project and outlines to the environment, consistently with appropriate tools for application

"One of the main principles of this approach is to consider sustainability, both to the excreta as waste water, not as a waste but as a valuable resource to be reused and recycled".

CURIOUS FACTS

The Integrated Sustainability Model for Wastewater Treatment Plants with Treated Water Reuse represents a clear choice to enhance the quality of life for many Bolivian men and women who lack sanitation services in populations with less than ten thousand inhabitants.

The NODE-SNV Project with funding from the Embassy of Sweden has been contributing to more than 6,500 Bolivian men and women improve their sanitation and hygiene and have healthy housing.

Decentralized Sustainable Sanitation as ecological sanitation, is a holistic view of the natural cycles in which wastewater and human excreta are not considered as waste but as reusable resources.

The WWTPs contribute to strengthen and increase sanitation services with a medium- and long-term vision; to seek for future greener cities and reduce the effects of climate change on populations which by their condition of resources are more vulnerable not only to climatic events, but the aggressiveness of a changing climate.

Demand generating of technology and construction, operations and social management, and reuse of resources as the basis of decentralized sanitation system are the main components of the Holistic Model of Sustainability.

UNDERTAKING ADESBVI/NODE ACTIVITIES

Gloria Lizárraga
ADESBVI/NODE
Chairwoman

The 2011 -2015 Basic Sanitation Sector Development Plan sets the goal of improving and expanding drinking water and basic sanitation, meeting the needs of everyone, to make effective the human right to drinking water and sanitation.

In Bolivia, the water and sanitation sector requires improving the sustainability of infrastructure projects being implemented in the country. One of the factors to achieve the expected sustainability is the COMDEV-CB component promoting implementation in mass execution programs of the Ministry of Environment and Water (MMAyA), which is responsible for implementing MIAGUA Program, financed by the Andean Development Corporation (ADC) and implemented through the Productive and Social Fund (SPF).

The National Service for Sustainability in Water and Sanitation (SENASBA) as a decentralized entity of MMAyA is responsible for developing EPSA capacities through technical assistance and capacity building, and implementing the social strategy of community development (COMDEV) and training processes, education and research.

Meanwhile, the Association of Water Sector Spaces, Basic Sanitation and Housing called ADESBVI/NODE, among its objectives, promotes, plans, articulates, strengthens sustainability and coordinates actions for the implementation of sustainable water and sanitation projects, enabling an integrated approach to sustainability through Community Development (COMDEV), promoting the use of Alternative and Innovative Technologies. ADESBVI / NODE Bolivia is a network of exchange and knowledge in sanitation, linking it to the support and development of national capacities with SENASBA and AAPS, among other stakeholders.

Within this framework and in compliance with corporate goals, two training workshops have been conducted in coordination and support to SENASBA, where different modules have been developed to be validated so that they can become guides that contribute to the implementation of water and sanitation projects in the cities of Santa Cruz, Cochabamba, with the participation of SENASBA technical staff, professionals and lead facilitators. This workshop was facilitated by professional staff of ADESBVI NODE.

As main results of this experience we have seen the importance of taking into account the theoretical, but mostly methodological aspects that contribute participants

"SENASBA as a decentralized entity of MMAyA is responsible for developing EPSA capacities through technical assistance and capacity building, and implementing the social strategy of community development (COMDEV) and training processes, education and research".

to extract practices favoring work and training of the company staff and the beneficiary population. Among these we can see that:

1. It is necessary to define the purpose of all modules, as well as the intended recipient thereof.

2. Presentations should have different training resources, avoiding overload.

3. Set the course of the workshop, identifying main activities, and defining the compliance with the rules.

4. Socialize among participants to generate empathy and foster dialogue, starting with the presentation of each one.

5. Identify expectations which will be useful in assessing the results of the workshop.

6. It is important to give an exhaustive explanation of implementation of the workshop until the end.

7. Apply a pretest of prior skills in each module.

8. To generate a participatory dynamic that expresses the content and skills they are expected to develop.

9. Do not show a “stereotypical” boss and authority attitude, being the most knowledgeable, or assume that the participants already know the subject.

10. Leave in the educational environment all media used.

It is advisable as facilitators adopt a positive and energetic attitude; show our commitment to working with the most vulnerable communities, with respect to environment, in defense of gender equality and equity and cultures with a focus on multiculturalism.

SUSTAINABLE SANITATION:

A CLEAR CHOICE FOR BOLIVIAN FAMILIES

María Sol Bagur D' Andrea
NODE-SNV Project Consultant

What is Integral Sustainability Model of Wastewater Treatment Plant for Water Reuse?

The Integral Sustainability Model of Wastewater Treatment Plant for Water Reuse, represents a clear choice to enhance the quality of life for many Bolivian men and women who lack sanitation services in populations under ten thousand inhabitants. The Integral Model of Sustainability has been proposed and developed by the Decentralized Node for Sustainable Sanitation Project, of SNV Netherlands Development Organisation (SNV) over the technological expertise developed in the Municipality of Cliza (Cochabamba) by AGUATUYA. It is aimed to increase the implementation of Wastewater Treatment Plants for water reuse in irrigation; education and training on the efficient use of water resources as well as generate new policies for the efficient use of water facing current impacts of climate phenomenon. This project has been facilitated with cooperation funds from the Embassy of Sweden.

Why Decentralized Sustainable Sanitation represents a clear choice for community development?

Sustainable sanitation focuses on the collection, separation and treatment of wastewater (gray and black) and sludge in nearby places to its generating sources, allowing the located reuse of treated water and, thus, greater proximity and involvement on the part of the population to treated water management.

Decentralized Sustainable Sanitation -as an alternative approach- has the following advantages:

- Lower investment costs, operation and maintenance.
- Greater and faster coverage utreach.
- It has a more holistic view of the water cycle and contributes to Integrated Water Resources Management (IWRM).
- Allows establishing closer contact and more direct involvement of target population.
- Its systems facilitate the performance of the role of direct implementation or control to third parties, by the local governments.
- Involves treatment of a smaller range of wastewater volume
- Boosts innovation in environmental technology and economically is more efficient.

Decentralized Wastewater System (DSS) is a clear solution and allows providing basic sanitation to populations where it is not possible

"The Integral Model of Sustainability has been proposed and developed by the Decentralized Node for Sustainable Sanitation Project, of SNV Netherlands Development Organisation (SNV) over the technological expertise developed in the Municipality of Cliza (Cochabamba)"

to have conventional sewerage systems, at least in short term. So also due to excessive pollution existing for most people by the lack of sanitation, the Decentralized Wastewater System bets the care of the environment.

What are the components of Integral Model?

Decentralized Sustainable Sanitation Integral Model focuses on a comprehensive social strategy with elements of Community Development (COMDEV), transversely, accompanying each of the components to be mentioned further, in order to motivate the development of the project and its sustainability.

Generating demand, technology and construction, operations and social management, and reuse of resources as the basis of decentralized sanitation system, constitute the main components of Integral Sustainability Model. It also focuses on aspects related to the closing of the cycle of sanitation and water reuse from a technical-environmental, social, economic and institutional approach.

"Decentralized Wastewater System (DWS) is a clear solution and allows providing basic sanitation to populations where it is not possible to have conventional sewerage systems, at least in short term"

Demand Management

Aimed at promoting the interest of potential service users under appropriate sanitation technologies. Based on the ongoing dialogue between users and suppliers of DSS technology solutions to build good relationships .

Demand Generation is possible through:

- Market exploration on the offer.
- The promotion and dissemination of technology offer.
- Preliminary identification of potentials and interests for the reuse of treated water.
- The expression of demand and consensus. The latter contemplates the definition of the project idea and ownership demand

Technology and Construction

Try to have a system of wastewater treatment including alternative technologies with low investment, operation and maintenance costs, and is consistent with the socio-economic and environmental context of the population. Furthermore, it focuses on the various demands of gender regarding the potential use of treated water.

This component is considered from a project idea, subsequently agreed by the funding sources and technology providers. This component allows:

- Selection and validation of alternative technology.
- The preparation of feasibility studies and completion of the funding source.
- Organization for the execution of the infrastructure works.
- Setting up mechanisms of social control of works and (where appropriate) the mechanisms of transparency in the bidding process and contracting.

Operational and social management

Referring to the governance structure for the management, operation and maintenance of sanitation systems and with reuse treated water. This component involves determining roles and responsibilities of stakeholders and contractual and financial arrangements capable of ensuring sustainability of service.

Within the operational and social management should consider three fundamental aspects:

- Administration management.
- Legal arrangements.
- Economic Finance Sustainability.

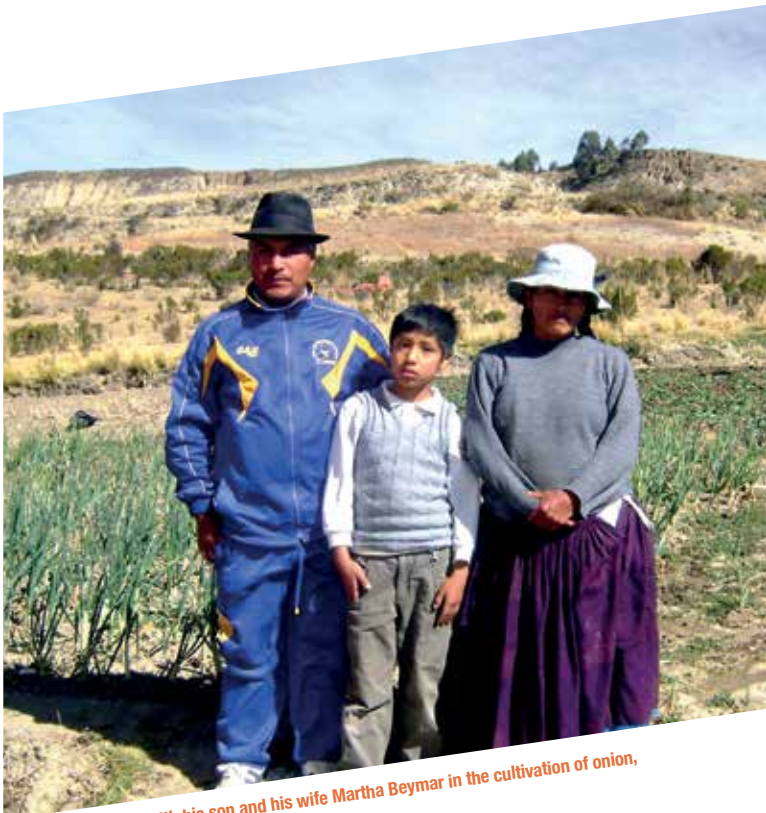
Resource reuse

It is concerned to incorporate wastewater to water resources at the local level under the lower risk for products, consumers and media production. The treated wastewater is part of an adaptation measure to climate change through the efficient use of water, even more in those areas of water stress. Finally, the reuse of wastewater is aimed to:

- To meet local water demands.
- Reduce potential risks to health and environment.
- Support sustainable development of productive and service sectors.

ECOLOGICAL ACHOCALLA: WATER SAVERS, THROUGH SANITATION MODULES

By Brenda Pardo
REUSSO-SNV magazine editor



Mr. Ernesto Santos, with his son and his wife Martha Beymar in the cultivation of onion, sprayed with urine. Huypaca - Achocalla , La Paz.

Climate change and its effects are increasingly evident in the world and in Bolivia. These effects concern the area of agricultural production and, especially, to those who live in the drier areas of the country.

These impacts, which are mainly expressed in the shortage of irrigation water can be met largely through the adaptation of agriculture to climate change.

Achocalla, is a municipality in the department of La Paz presenting water stress; however, despite the little water they get, they do not waste it using to conventional bath

"Mapit Sartasiñani", meaning let's get up than once, is a social group from Achocalla, consisting of young, elderly, children, professionals, etc. supporting their community in different themes that are of importance, and ecological sanitation is not indifferent to them. It is so, this group raised awareness among the Community, with the support and supervision of Sumaj Huasi Foundation and Swiss Contact for the construction of Sanitary Modules or Dry Toilets.

"One of the benefits of composting toilet is that we save drinking water. Since there is no sewerage, here we were used to cesspools (...) i.e., we have water to drink, but we do not have quite a lot to waste on the toilet while we get benefits of feces and urine" tells Mr. Ernesto Santos, beneficiary of Sanitary Module in Achocalla.

Training provided by Sumaj Huasi was very significant for the people living in Achocalla, since - as they mention- they opened their eyes to the importance of saving water and especially considering the excreta and urine not as waste but as resources for earth.

"Feces that are deposited serve as fertilizer, and urine helps plants as it works as fertilizer (…) Also we throw bath tissue in the toilet, because it also serves to manure as it gets decomposed" are the words of Don Cipriano Mamani, an elderly man, who is well known by their neighbors in Achocalla as the most creative in the Community, for his many innovations made in favor of the environment.

Despite of skepticism of people about the lack of odor in these modules, Mrs. Marina Mamani says: *"toilets do not smell because they are ventilated through the window and the vent pipe. When you def-*

"Verónica Mamani Rodríguez, Finance Secretary of Mapit, accompanied us on the Achocalla tour and emphasized that it was difficult to make people aware how to use this bathroom since they were afraid to manipulate their own feces and urine, *"but now, people already know and those who do not yet have, want to build because they are watching the other examples".*

Decomposition process of excreta.

Fermentation of urine.

> *"The harvest with urine has larger fruits and leaves last longer, so we can sell onions, lettuce, tomato, carrot of better quality. The use of urine in crops does not represent any risk for health."*

ecate, it does not smell because we cover with fine sand or sawdust and feces get dried. Once barrel is full, we bury the stools in an excavation of 50x50 cm. and after eight months or so, take it out and see if it is ready to be used on our crops."

Urine treatment takes three months of fermentation and then it is used to fumigate. "Here we produce vegetables: onion, carrot, cabbage, turnips, etc. and we water with the urine; Sumaj Huasi has taught us (three parts water to one part urine). At first we were a little scary, but we tried to see how it works, we irrigated part of the and not the other. The harvest with urine has larger fruits and leaves last longer", tells Mr. Ernesto while proudly shows their onion crop. Also, Mr. Ernesto's wife, Mrs. Martha Quispe, adds that the crop is primarily for self-consumption, but thanks to the properties of the urine, they are producing more, so do not waste the opportunity to sell.

Despite this great undertaking of the Community of Achocalla and the valuable support of the Sumaj Huasi Foundation, Veronica Mamani says that there is still much to do, and therefore makes a request: *"I ask the authorities, the Mayor, to Sumaj Huasi Foundation more support, and that they do not forget us. At the moment, the municipality does not support us, all these composting dry toilets were built on our own initiative".*

With this call in authorities for further collaboration, Veronica is very

Mr. Cipriano Mamani, at the door of his Sanitation Module. Huypaca - Achocalla , La Paz.

happy for the achievements, and the goal of *Mapit Sartasiñani* is to continue to support the construction of composting toilets so that everyone in the community have a toilet, as a contribution to the environment.

So far

16 **are beneficiaries of composting dry toilets:**

Year 2012:

- Celia Rodríguez (Allancacho chico)
- Telmo Nina (Pucarani)
- Lázaro Herrera (Junthuma)
- Carlos Chipana (Pacajes)

Year 2013:

- José Laura (Pacajes)
- Eusebio Torrez (Marquirivi)
- Petrona Quispe (Marquiviri)
- Cristina Condori (Marquiviri)
- Silvia Quispe (Pucarani)
- Victoria Alvarado (Kañuma)
- Ernesto Santos (Huypaca)
- Cipriano Mamani (Huypaca)
- Marina Mamani (Pacajes)
- Claudia Quispe (Pacajes)
- Geral Adrián (Pucarani)
- Hipólito Llanque (Junthuma)

WATER

A VITAL PUBLIC GOOD:

RIGHT OF CITIZENS AND DUTY OF STATE

Marcelo Barrón R.
SNV Public Policies Advisor

Water, as it is known by all and traditionally studied, is essential for life and is a public good to which all citizens -regardless of their diversity and their territorial residence- are entitled to have in quantity, quality and multiple use.

The State –by civil society mandate- has the superior and inescapable duty to execute all actions at its disposal within the framework of its competences, to consecrate the right of citizens and realize their exercise with efficiency, equity, permanent continuity, transparency and accountability.

Particularly, water for human consumption and for production use today is a discussion topic especially for the least developed countries with greater relative poverty, among which is Bolivia.

The shortage, deficiency, intake/storage, distribution and wastage - losses and non-essential use-, inequity in access, cultural behavior of irreducible private appropriation, the wide gap between demand and supply of services to its provision, low relative quality and even the cultural resistance to use of recycled water, among others, are the growing causes of demand, pressure and social unrest questioning formal and symbolic approaches of democracy, governments and some public policies.

- Quality of solutions is related to proper water for a healthy human consumption, non-polluted production and other uses, with enough availability and efficient and equitable provision systems.
- Sustainability is related to ensure water availability in a long term, quality and access to current and future generations, making inhabitable urban, suburban and rural spaces,

Policies and solutions should have 50 years or more horizons, although certain action and projects could have less temporality, but only as intermediate milestone of gradual approaching to long-term goals, designing, monitoring and measuring results and impact to achieve periodically and systematically, and giving feedback to actions from those who take solution in different spheres.

Water management, specially intake and storage, is highly related with integral basin management,

environmental management and their adaptation to climate change; also use of industrial-technological solutions avoiding loses and allows recycling improper water to turn them into suitable mainly for human consumption and production use.

Some of the central themes to be considered by public politics are as follows:

1. Concepts and strategic content regarding problems to solve and solutions to be taken to medium and long term vision; clear orientation to social, economic and environmental impact, considering the multi-sector character of integral water management.

2. The proposal of technological solutions to troubles of water availability, storage, Access and use, which affects structurally and be sustainable at long-term.

3. Action lines, pillars consistent axes leading to achieve objectives and goals.

4. Management effectively decentralized, to approach people to specific and concrete reality, improving knowledge of such reality and promoting the ideal articulation to citizens and organizations.

5. Prevision of a nationwide framework, specialized regulations to ensure that anywhere in the country, citizens could exercise their right (to enjoy water for its welfare), decreasing asymmetries and encouraging solidarity.

6. Public institutionalism with: i) clear competencies and attributions ii) organized, explicit, central and decentralized institutionalism iii) enough and well-trained human resources, iv) funding, tax sustainability v) physical means, such as installations, equipment, vehicles, etc. iv) express legal mandate, loyal nature and specified territory jurisdiction.

7. State stakeholders concurrence, understood as knowledge, investment design, using comparative, subsidiary, co-responsibility advantages, also clear responsibility of each stakeholder in this scenario so as not dilute it, which goes beyond the usual and simple co-funding.

8. Management ability and public investment execution, transferred to sustainability operational phase with mixed, public, community and private modalities, conventional and non-conventional.

9. Public policies of integral water management recognized and legitimized by civil society.

10. Social participation and citizenship efforts to solutions of public policies with solidarity and co-responsibility.

11. Policies monitoring supported by information technology to social, economic and environmental impact measure and evaluation, feeding back planning and the policy itself.

12. Accountability over results and impacts of policies, programs and implemented projects.

CONSTRUYENDO MAS ESPERANZAS PARA + VIDAS

CLIMATE CHANGE

A LOOK AT SANITATION IN THE CONTEXT OF CHANGING CLIMATE

Liliana Gonzáles A.
SNV Water and Sanitation Advisor

Percentage of sanitation coverage in Latin America, according to the latest report Joint Monitoring Program[1], reaches 82%. Bolivia is being located in this context, and barely grasps 46% of sanitation coverage, making us reflect not only on the situation of poverty that more than half of the population suffers, but also in the difficulty for the country to achieve goals related to the Millennium Development Goals or just the goals set in the National Agenda 2025, regarding sanitation coverage.

To achieve a proper infrastructure for water and sanitation to sustain population growth and, especially the urban population, it is very important since this condition without sanitation works directly with

1 Joint Monitoring Program, Progress on sanitation and drinking-water - 2014 update, World Health Organization and UNICEF

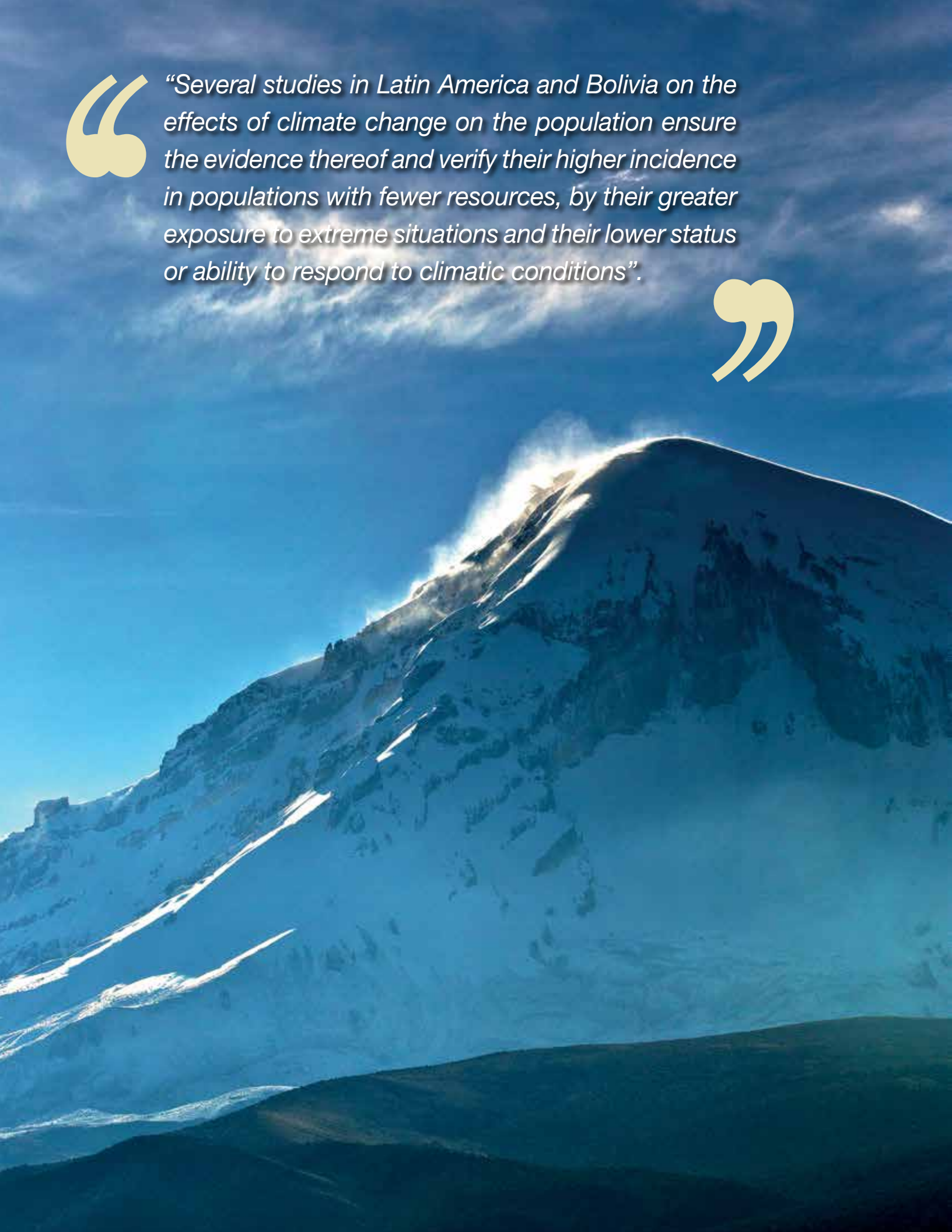
alarming rates of pollution, directly affecting the health of society and welfare, causing various diseases and increasing mortality rates, with higher prevalence on childhood.

The situation of lack of connection systems the sewerage network, and the lack of Plants Wastewater Treatment Plants in different cities nationwide, contributes directly to deepen the problem of water pollution of river beds that surround the cities and, in turn, lead to problems of food security when reusing wastewater in crop plots of traditional use without any treatment. The most meaningful case, Rio Abajo crops in the city of La Paz.

The uncontrolled development of cities and growth thereof, under the logic of inefficient infrastructure decisions for storage and water distribution and sanitation service unsuitable for sustaining the growth

"Decentralized Sustainable Sanitation is expressed in practice through ecological toilets modules without water drag offered through the use of ecological dry toilet".

of a given population, become potential risks to human welfare. The problem, with which cities currently coexist, gets bigger mainly in those fast growing. Urban centers, in addition to the plight of pollution and effects on the health of its population



“Several studies in Latin America and Bolivia on the effects of climate change on the population ensure the evidence thereof and verify their higher incidence in populations with fewer resources, by their greater exposure to extreme situations and their lower status or ability to respond to climatic conditions”.

by the lack of adequate sanitation systems, facing the sharpening of crisis by the effects of climate change, which accentuates the availability and quality of water and increases vulnerability of the population to more sensitive diseases[2] climate change as well as acute respiratory and diarrheal diseases.

Climate change is responsible for the increase and spread of infectious diseases. Water supply in Andean highlands is being affected with the glaciers melting in the country[3] and the risk of flooding increases in lowlands[4]; biodiversity is threatened and new pests and diseases are disseminated in crops. Aspects of insecurity and social conflicts are initiated by the force of the increase in migrant populations in urban areas.

Several studies in Latin America and Bolivia on the effects of climate change on the population ensure the evidence thereof and verify their higher incidence in populations with fewer resources, by their greater exposure to extreme situations and their lower status or ability to respond to climatic conditions

In this context of deprivation, where emerging cities become the hope of developing highly migrant populations, decentralized sustainable sanitation systems constitute a good choice, appropriate for the needs of the population, in terms of access to sanitation services at home, able to decrease the pressure of water resources distribution due to the lower consumption and decreasing pollution effects in outlying areas by the effects of practice open defecation.

Ecological sanitation is seen as a response to tackle air pollution in suburban areas.

Sustainable Decentralized Sanitation, by providing highly proven technologies in our setting, offers a solution for ecological sanitation demand and saving water as a measure of adaptation to climate change, as well as clear option for reducing vulnerabilities in the field of health that affects populations by environmental pollution and unhealthy living conditions.

Decentralized Sustainable Sanitation is expressed in practice through ecological toilets modules without water drag offered through the use of ecological dry toilet, is

2 Climate Change Water and Health in Ancoraimes y Batallas, IDH – UMSA. Aparicio Effen Marilyn, March 2014.

3 As an example populations living in high poverty in the Andean region of the country. Up to 2030, a growing shortage of water in the metropolitan area of La Paz and El Alto

4 E.g., the latest floods in Beni Department.

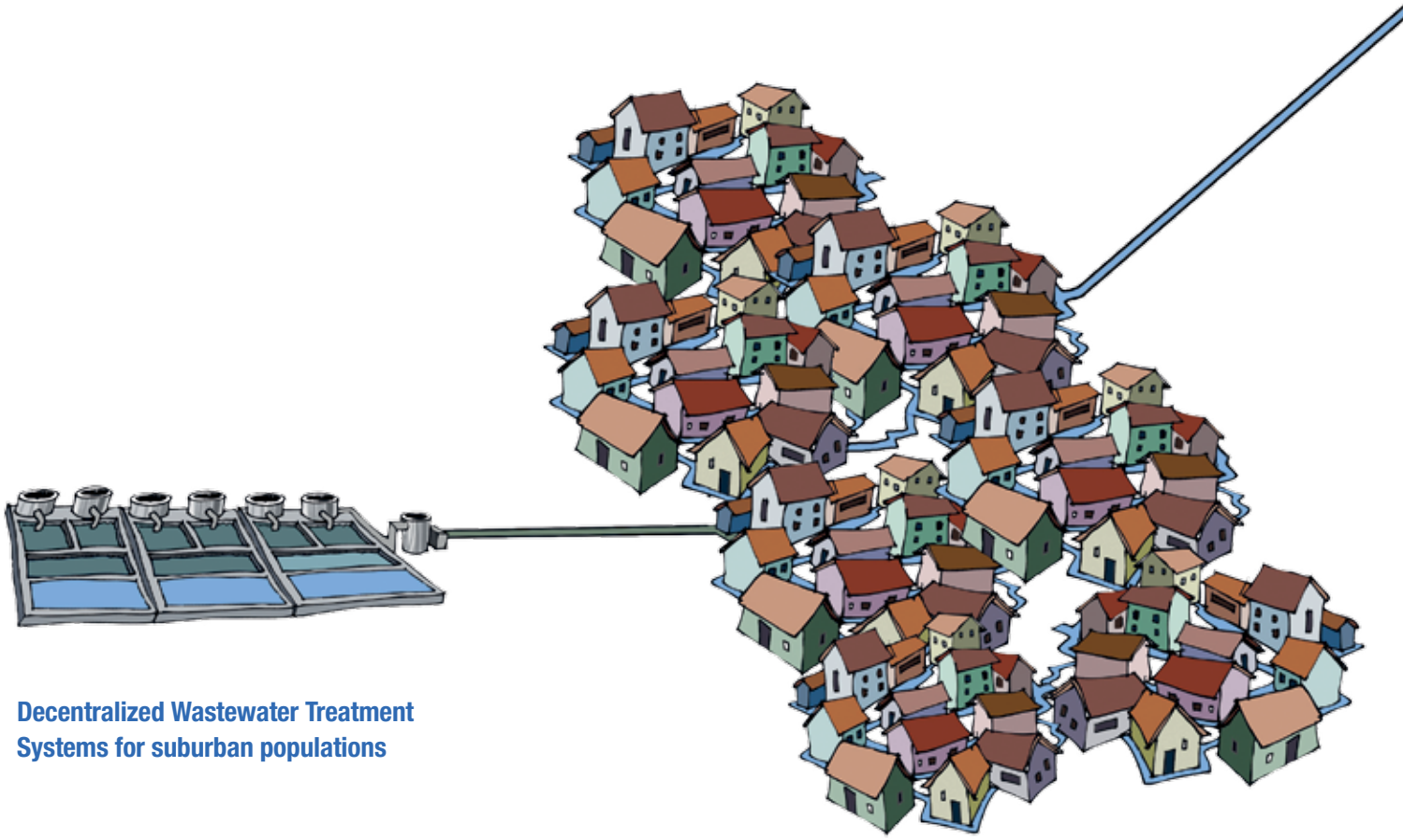
"Ecological sanitation modules are recommended systems by their direct benefits in water saving and reducing negative impacts on health, and indirect benefits from organic production frames through reuse practices of products and returning nutrients to Mother Earth".

complemented by the provision of treated grey water systems through small household use as bio-gardening within households, creating green spaces for recreation or cultivation of small family gardens.

Decentralized Sustainable Sanitation through collection systems and treatment of liquid and solid materials from organic composting toilets with dual-chamber technology, are transported to storage and processing centers to be converted the two into using organic products accepted in certain crops generating efficiencies in agricultural production and protecting food security.

In this way, ecological sanitation modules are recommended systems by their direct benefits in water saving and reducing negative impacts on health, and indirect benefits from organic production frames through reuse practices of products and returning nutrients to Mother Earth.

Decentralized Sustainable Sanitation also expresses in the practice of Decentralized Wastewater Treat-



Decentralized Wastewater Treatment Systems for suburban populations

ment Plants, implemented through bio filters and bioreactors systems responsible for transforming sewage discharges into treated water free of BOD and DQO5, able to be reused in different economic activities such as forestry, ornamental and / or crop fields.

These relative size systems are conducive to populations smaller than 10 thousand inhabitants, offering a decentralized system and putting attention on discharges from nearby and concentrated towns, avoiding this way, long distances of conventional central sewerage systems. In turn, also optimize financial resources from responsible bodies for the provision of assistance to municipal level and users by the obligation of payments for the service which they incur with less cost.

A Decentralized Wastewater Treatment Plan provides optimum service for small nearby and concentrated populations which if we compare with classical connections to conventional networks; they are made via connections from the surrounding housing to nearby wastewater treatment systems and with capacity to reuse treated water.

These new systems help to strengthen and increase sanitation services with a medium- and long-term vision; to seek greener future cities; and reduce the effects of climate change on populations which by their capacity as resources are more vulnerable not only to climate events; but the aggressiveness of a changing climate that today lives with us and is installed presuming to be a new condition of life.

Achieve adaptation to climate change in our setting requires a tremendous alliance and cooperation between public, social and private stakeholders; a better understanding of the topic, a controlled development; of broad institutional efforts, for decision-making and financial resources policies able to promote innovative technology initiatives to meet this challenge.

5 Biochemical oxygen demand and chemical oxygen demand.

ASSOCIATION OF SECTOR SPACES IN WATER, BASIC SANITATION AND HOUSING

Carla Becerra
SNV NODE Project

Association of Sector Spaces in Water, Basic Sanitation and Housing (ADESBVI), started from the initiative of agglutinating different public and private stakeholders working in the area to address the same horizon. Marking its inception in 2007, with the National Board of Sector Spaces (DINESBVI) organization as a structured unifying entity, under the participation of one representative by Sector Space, elected in each Department, as well as the nomination of a regional responsible for Highlands, Valley and Lowlands with the purpose to be the liason nexus and communication.

Such decision has been supported by the Vice-Ministry of Basic Services, as a collegiate coordination mechanism to facilitate greater communication and collaboration multidimensional, vertically between local, regional and national governmental institutions, as well as among Departments and NGOs, international agencies and private initiatives.

Also, Department Sector Spaces (DSS) were created covering different sectors, such as water, sanitation, housing, health and agriculture among others.

Due to regulation changes in legal procedures of ADESBVI, it was proposed to change the name, so that on May 2008, was created the national space called ADESBVI. Such difficulties lead the Board

"Since 2008, up to date ADESBVI has been strengthened institutionally through "NODE Decentralized Sustainable Sanitation Project as Knowledge and Impact Generation on Sustainable Solutions Platform" (NODE-Bolivia), with the support from the Embassy of Sweden and leaded by the Netherlands Development Organisation (SNV)".

to propose in the Convention, consensus for the legal conformation at national level, chosing the Legal Capacity in La Paz Department, starting with necessary procedures late in 2012.

ADESBVI agglutinates the efforts of Departmental Sector Spaces with the main goal to promote, plan, articulate, strengthen sustainability, coordinate actions and integrate sector policies as a mechanism to implement sustainable water and sanitation projects in rural and suburban areas, allowing a sustainability integral approach, attending the needs of population lacking of such services.


GOBIERNO AUTÓNOMO DEPARTAMENTAL DE LA PAZ
Dr. Cesar Hugo Cocarico Yana
GOBERNADOR DEL DEPARTAMENTO
PERSONALIDAD JURÍDICA
ASOCIACIÓN DE ESPACIOS SECTORIALES EN AGUA, SANEAMIENTO BASICO Y VIVIENDA cuya sigla es ADESBVI

On 2013, Departmental Sector Spaces meetings were held in Cochabamba, Santa Cruz, Sucre, Tarija and La Paz, where the representatives were elected, with the purpose to enlarge and strengthen the National Directorate of ADESBVI. This was the main reason to carry out the first National Meeting in 2014, with the purpose to communicate, coordinate and plan activities to carry out, in charge of an elected representative, who forms part of the enlarged board.

Since 2008, up to date ADESBVI has been strengthened institutionally through "NODE Decentralized Sustainable Sanitation Project as Knowledge and Impact Generation on Sustainable Solutions Platform" (NODE-Bolivia)," The Project currently has as its main objectives to facilitate enough tools to contribute to ADESBVI/NODE institutional, organizational and management capacities building, through the use of physical and virtual media use of technical assistance, research, training, com-

"ADESBVI agglutinates the efforts of Departmental Sector Spaces with the main goal to promote, plan, articulate, strengthen sustainability, coordinate actions and integrate sector policies as a mechanism to implement sustainable water and sanitation projects in rural and suburban areas".

munication and spread regarding systematized generation of information from decentralized sanitation sector[1].

ADESBVI is aware of the support given by the Embassy of Sweden and SNV, and is motivated to carry out necessary activities to get the Legal Capacity where the tireless effort from the Board, leaded by the President M.Sc. Gloria Lizarraga, persisted with the task during 2013, materialized in the II National Meeting of ADESBVI and the I meeting of 2014, held on February 21, with the introduction of Legal Capacity in the Convention, as its first achievement to allow ADESBVI and NODE the institutional strengthening accomplishing this way with the main Project objective.

1 Annual Operation Plan, 2014, (PNODE I – PNODE II)

EVALUATION OF HUMAN URINE IMPLEMENTATION AS ALTERNATIVE FERTILIZER IN VILLA CARMEN PILOT CENTER

Gabriela Mariaca, Extracted from the thesis of Alejandro Campos,
Faculty of Agricultural Sciences
University "San Francisco Xavier de Chuquisaca".

Due to the effects of climate change and desertification, it is essential to develop new techniques for water sustainable management and inexpensive fertilizers use. One of the most promising paradigms is ecological sanitation, an alternative to conventional sanitary system, conceiving the urine and feces as resources to be used in agriculture, due to its high content of nutrients. This research is the first experience in our environment on the use of treated human urine as an organic inexpensive fertilizer and sustainable production.

On the foregoing, the research aims to evaluate the application of different doses of decomposed human urine in the cultivation of carrot (Daucus carota), in shallow tunnels in the pilot center of Villa Carmen as organic inexpensive fertilizer. The study aims to contribute to a technological alternative for organic fertilization with the use of treated human urine.

To carry out this investigation carrot crops were used, to which different treatments were applied as detailed below with their respective doses:

T0 = Witness (no urine)

T1 = Doses 1:3
(1 liter of urine x 3 liters of water)

T2 = Doses 1:4
(1 liter of urine x 4 liters of water)

T3 = Doses 1:5
(1 liter of urine x 5 liters of water)

T4 = Doses 1:6
(1 liter of urine x 6 liters of water)

T5 = Doses 1:7
(1 liter of urine x 7 liters of water)

Three applications for each treatment were performed: the first one was carried out before sowing; in this case, they were left to stand for a few weeks in soil for a good availability of all nutrients; the second application was made 30 days later. They conducted opening small ditches directly to the ground; once applied human urine, it was covered with the soil. The third and final application was performed 30 days after the second; it was proceed in the same manner and complied a period of one month between the last fertilization and harvest.

The most important result is the performance obtained as to the quantity of carrots produced per hectare using T3, resulting value in 59.4 tons / ha, a rather high value compared to average performance of carrot in our environment, which is 10 tons / ha and the average performance of the genetically enhanced carrot ranging between 30 and 40 tons / ha, according to the National Institute of Agricultural and Forestry Innovation (INIAF).

EFFECT OF DOSAGE OF HUMAN URINE ON PAPRIKA GROWING IN VILLA CARMEN – YOTALA

Gabriela Mariaca, Extracted from the Thesis of Javier Humeres, Faculty of Agricultural Sciences University "San Francisco Xavier de Chuquisaca."

In recent years, it has been observed that there are great challenges for humanity because of global warming, since the resulting impacts alter agro ecosystems, reducing global food production, as is the case of paprika cultivation in our country.

For this purpose, we did research and developed ecological sanitation as an alternative to the conventional system, with the aim of finding a solution to social and environmental problems, considering the urine and feces treated as resources to restore soil fertility and increase crop production and, also reducing water losses resulting adaptation options to climate change. Also, the use of inorganic fertilizers, and current agricultural practices have degraded agricultural soils, thinking they would enhance fertility and therefore producing more, all that has been achieved is to impoverish the soil. Thus, this research was developed as an alternative production, based on the application of human urine treated with different concentration levels as a source of organic fertilizer.

The research was conducted at the Farm Villa Carmen, horticultural module, of Agricultural Sciences Faculty based in the town of Yotala, which belongs to the University "Mayor Real y Pontificia de San Francisco Xavier de Chuquisaca", with the purpose of contributing to the increase in organic crop production of paprika, from the application of human urine as a nutrient source. It's intended to analyze the performance of growing paprika for different doses of fertilizer application

The work consisted of applying different doses of treated urine, (50 liters of urine with maceration time than 6 months) to the cultivation of paprika. To prepare the solution five different doses applied on 3 separate occasions were determined, the different rates of application are described as follows:

We did research and developed ecological sanitation with the aim of finding a solution to social and environmental problems, considering the urine and feces treated as resources to restore soil fertility and increase crop production.

T1 = Witness = 20 Liters of water

T2 = 6.5 Liters of urine + 13.5 Liters of water = 20 Liters of solution

T 3 = 5 Liters of urine + 15 Liters of water = 20 Liters of solution

T4 = 4 Liters of urine + 16 Liters of water = 20 Liters of solution

T5 = 3.8 Liters of urine + 16.2 Liters of water = 20 Liters of solution

The most important result obtained is the production performance per hectare of paprika, this value was 49.6 ton / ha for the treatment T4, a considerable value when compared to the world average which is 13 ton / ha, the highest performance obtained in Israel reached 45.4 tons / ha.

In general, it can be concluded that the use of human urine diluted to 1:4 (T4 = 20% of urine), 1:5 (T5 = 17% of urine) in the cultivation of paprika, gave the best results for the six variables studied, so its application is advisable.

DEVELOPED WORK IN ACTIVITIES OF SANITATION REGULATION

Edson Solares
AAPS Chief Executive

Oversight and Social Control Authority of Drinking Water and Basic Sanitation (AAPS), in the existing regulatory framework, works to develop regulatory policies that help to achieve the goals of Agenda 2025 proposed by the Government, with regard to the provision of potable water as well as in the implementation of the sanitation system for this purpose and within the framework of their competences, adopted the Regulatory Administrative Resolution No. 227/2010 of 3 December 2010, prioritizing certain activities, among which we mention:

1. Oversight of industrial effluents

"Decentralized sustainable sanitation is expressed in practice through ecological sanitation modules without water drag is offered through the use of ecological dry toilet".

According to the Basic Sanitation Sector Development Plan 2008-2015, 70% of the wastewater collected by existing sanitation systems in Bolivia, are discharged into rivers and / or streams without treatment, with the risk of contamination of surface water courses, soil and groundwater aquifers.

Wastewater Treatment Plants (WWTP) existing in our country, have as general objective the protection of public health, through the removal and treatment of human waste products, as well as the protection of quality of surface water sources and the environment.

However, despite these efforts, WWTP are being questioned on its performance in terms of their operation and due to high demand maintenance costs.

On this regard, AAPS began auditing actions to EPSAs´ procedure, in the control of industrial and special effluents, aimed to:

- Evaluating the quality of effluent.
- Developing statistical comparisons for determining, by means of the parameters evaluated the efficiency of treatment systems for industrial and / or special users.
- Improving the efficiency of the implementation of environmental measures defined by industrial and / or special users, to reduce or mitigate adverse impacts on water bodies or WWTP.
- Verify the effectiveness of outlined measures on Administrative Technical Procedures of Industrial and Special Download from EPSAs.
- Determine the efficiency of removal of pollutant load in the WWTP of EPSAs.

By the results of the actions taken by the AAPS, it's recommended the implementation of a "Monitoring, Control and Supervision Program of Industrial and Special Effluents", watching the efficiency of removal of the pollutant load in the WWTP from EPSAs, in order to mitigate pollution of natural bodies receptors.

70%

of the wastewater collected by existing sanitation systems in Bolivia, are discharged into rivers and / or streams without treatment

2. Sludge Transporters and Collectors - ETRL Companies regulation and regularization

The experienced urban explosion in Bolivia, besides the lack of investment in sewage, has contributed to alternative sanitation systems (septic tanks, absorption wells, latrines, etc.) be a common measure between families living in suburban and rural areas.

Conventional sewerage systems should accompany parallel to the water system, this does not happen in reality; however, being responsibility from EPSAs within their areas of service delivery, it has been deemed appropriate incorporate alternative sanitation systems in the regulation of EPSAs, as a measure to comply with Agenda 2025.

Moreover, the AAPS provided that the solution of alternative sanitation systems demanding proper treatment of fecal sludge and this is limited or unavailable, so they tend to be associated with:

"28 Sludge Transporters and Collectors - ETRL Companies were regularized by the AAPS nationwide, of which 93% operate in the Department of Santa Cruz".

- Environmental pollution caused by the overflowing of latrines and underlying aquifers.
- Risks to human health due to exposure to poor sewage tanks and uncontrolled use of fecal sludge in agriculture.

Therefore collecting fecal sludge and wastewater could be improved by using ecological sanitation systems in situ. However, lack of experience in the construction, operation and maintenance of these alternative systems and poor management of fecal waste affect workers, residents and even the environment.

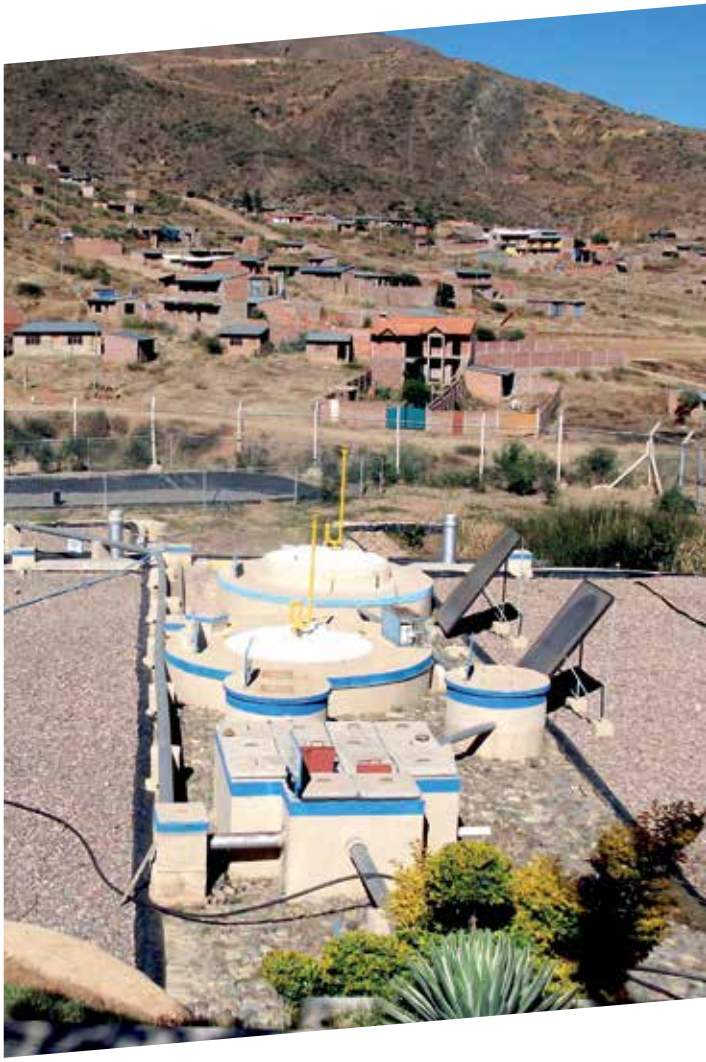
This underlines the need not only to professionalize the market but also to establish a proper regulation of related services.

AAPS as a regulatory entity of water and sanitation systems, features a progressive model of regulation and social participation, which has revealed in issuing Regulatory Administrative Resolution No. 227/2010, which establishes:

a) fecal sludge collection service providers (Sludge Transporters and Collectors - ETRL Companies) must obtain authorization from the AAPS to work

b) charges for fecal sludge treatment received by tanker trucks must be approved by the AAPS, and

c) drinking water and sanitation service providers must submit a plan for the disposal of fecal sludge, with the purpose of ensuring that they would be evacuated in Wastewater Treatment Plants (WWTP), for their respective treatment, in order to assist in the mitigation of pollution of natural water bodies.



"The experienced urban explosion in Bolivia, besides the lack of investment in sewage, has contributed to alternative sanitation systems be a common measure between families living in suburban and rural areas".

With this goal in l2013, the AAPS regularized 28 Sludge Transporters and Collectors - ETRL Companies, nationwide, of which 93% operate in the Department of Santa Cruz, performing also the operation audit of these services, in terms of volume, quality, customers, downloads, fees, equipment, etc.

3. National Workshop on Regulatory Management of Alternative Sanitation Systems

In the past, the paradigm of urban sanitation focused on extending massive collection services and wastewater treatment. While conventional sewerage is still preferred by most, since the last decade is looking for lower costs of supply, installation, excavation and filling through the modality of alternative sanitation systems. The problem is that many of these systems lack the technical and environmental criteria, which threatens the environment and public health.

In this regard, in order to inform and to exchange international experiences that help to solve these challenges that the sector faces, AAPS, in coordination with the World Bank, conducted the "National Workshop on Management Regulatory Alternative Sanitation Systems" in the city of Santa Cruz, held on October 2013, with the participation of representatives of EPSAS, ERTLs, FEDECAAS, FENCOPAS, international experts and technical staff of the AAPS.

The workshop was developed based on the following presentations:

El taller se desarrolló en base a las siguientes ponencias:

- AAPS. Dissemination and sharing of RAR AAPS No. 227/2010 and regularization process.
- EXPERIENCE IN ROSARIO, ARGENTINA "Technical considerations for receiving domestic fecal sludge in wastewater treatment plants", elaborated by Dr. Ana María Ingallinella, Specialist on Treatment Plants of Rosario, Argentina University.
- EXPERIENCE OF SUMAJ HUASI FOUNDATION on "Ecological sanitation in response to water conservation and recovery of the value of waste ", exposed by engineer Oscar Suntura, Director of Sumaj Huasi Foundation.
- EXPERIENCE IN DAKAR – SENEGAL "Use of new technologies to improve cleaning services of septic tanks, in the case of Dakar-Senegal, exposed by Sarah Nerling, Switchboard Project Director of the International Organization Poverty Action: Senegal

To that extent, the AAPS performs procedures to incorporate indicators of management of EPSA, alternative sanitation systems eligible by users or EPSAs, to assist in achieving the objectives set in Agenda 2025.

INTERVIEW TO ISABEL ASCARRUNZ, SPECIALIST IN ENVIRONMENT AND WATER OFFICIAL PROGRAM - EMBASSY OF SWEDEN

SWEDISH COOPERATION IN WATER SECTOR IN BOLIVIA, A RELATIONSHIP OF MUTUAL TRUST

"Bilateral funding from Sweden to Bolivia on the topic of water increased sharply from 2006 to 2009".

What is the work that the Swedish Cooperation is developing in the water sector in Bolivia?

When I started working at the Swedish Development Cooperation Agency (Sida) on 2001, I did not think how challenging would be the last 14 years of my life for many reasons, but mainly by the implication of the challenge the fact to be part of:

a) design of the new funding initiative from Sweden on adaptation of climate change (2009-2012), many of these are still being implemented;

b) allocation of funds under the concept of programmatic approaches ("Programme Basic Aproach"), sometimes with instruments such as the Performance Assessment Framework PAF (Multi-donor UNICEF, National Watershed Plan and sector/ programmatic budget support) and

c) the development of innovative technological models: Composting Dry Toilets (CDT) and Decentralized Wastewater Treatment Plants (D-WWTP).

Sweden has developed specific experiences and seated strong bases in water and sanitation sector in Bolivia since the early 90; the support has focused not only to investments in water and sanitation infrastructure in rural area and urban expansion, but also and, perhaps more importantly, the sector capacities building and implementation of innovative models of cooperation and technology, strongly contributing to the technical standards of the industry.

Current standards were strongly supported by Sweden, through Technical Support Project PROAT 2002-2006, and results of projects for alternative technologies were collected in different Technical Guidelines, also highlighting the Composting Dry Toilets Program that is being currently run by MMAyA. The strong level of dialogue that Sweden had introducing the topic of Gender Equity Mainstreaming (GEM) was collected in Community Development Guidelines of the sector in force.

Bilateral funding from Sweden to Bolivia on the topic of water increased sharply from 12 in 2006 to 19 million SEK in 2009. On the other hand, a final overall assessment concludes that the support on the topic of water is probably the greatest impact and close to achieves the goal set by the Swedish Strategy 2009-2013.

"Support on the topic of water is probably the greatest impact and close to achieves the goal set by the Swedish Strategy 2009-2013".

1 Sida´s Water Portfolio 2006-2008, Quantitative Analysis, Sida 2009. About 1.9 millions of dollars

2 Sida´s Water Portfolio 2006-2008, Quantitative Analysis, Sida 2009

However that may be the achievement, stands out the integration of adaptation to climate change to the portfolio of water and sanitation in Bolivia, through indicators and specific goals related to improving better use of water resources in the 2011-2015 PASAP Program, which is funded jointly by the European Union and by supporting of decentralized sustainable sanitation solutions with the Project.

Node/SNV 2012-2016.

Remains in my memory the year 2009, Shrove Tuesday, working with the consultant on indicators of climate change adaptation SMART in the "Muticine" coffee, like someone would say those were the days!

Node/SNV Project with the three partners: Water For People (WfP), AGUATUYA Foundation (FAT) and SUMAJ HUASI Foundation (FSH), through its activities, contributes not only to bridge the gap in demand for services but also especially of capacity building in water governance and development dialogue platforms among multiple stakeholders, contributing -this way- to decrease potential conflicts around the topic. Regarding the virtual platform www.anesbvi-nssd-bolivia.org converge many partners both from the Multinational State as from civil society.

Then, the impact from Swedish Cooperation in Bolivia to water and sanitation sector is beyond their contribution to the MDGs, but in terms of programmatic approaches has developed together with other donors and the Government of Bolivia; ongoing and continued support in innovative themes; support to standards, regulations and technical standards; developing approaches and working integrated models of cooperation in the sector (research, capacity building and service delivery).

Which has been the biggest challenge in the context of projects undertaken by the Cooperation?

I can say conclusively that the portfolio of Sweden has been strategically designed for projects complement each other, supporting both works, such as capacity building and sustainable water management in direct coordination with several Government agencies, Multilateral and Bilateral cooperation and NGOs. On all these years, when the institutionalism of the sector is constantly changing, as I use to say a constant earthquake, it was required a strong personal motivation to lead and build joint processes together with numerous Bolivian and international partners.

Experiences from Sweden, during these years, should be shared and surely the SNV/NODE project will be an important vehicle for achieving sustainability of the results achieved, perhaps in new game boards where the private sector and academia can also converge when the Swedish cooperation leaves Bolivia, expected to be in 2015.

"Experiences from Sweden, during these years, should be shared and surely the SNV/NODE project will be an important vehicle for achieving sustainability of the results achieved".

INTERAGENCY PARTNERSHIPS

TO ACHIEVE THE GOALS OF SANITATION FROM THE PATRIOTIC AGENDA 2025.

Jhonn Gomez
NODE-SNV Consultant

"Pillar No. 2: Socialization and universality of Basic Services with sovereignty for Living Well, proposes a target of 100% of Bolivian women and men have services of potable water and sewerage, understood under fair conditions and in balance and harmony to Mother Earth".

The Political Constitution of the Multinational State of Bolivia provides that basic water and sanitation services are human rights. Also the State is obliged to ensure full access of the Bolivian people to these services on equitable conditions in balance and harmony with Mother Earth.

In this regard, the Patriotic Agenda 2025 Pillars of Dignified and Sovereign Bolivia, poses great challenges to achieve in relation to 13 thematic afflicting the national development and need to be regulated. This way, the Patriotic Agenda 2025 constitutes a long-term plan of the Multinational State of Bolivia, in

which the different levels of government provide for a coordinated and integrated vision for national development and compliance with these challenges.

Particularly Pillar No.2: Socialization and universality of Basic Services with sovereignty for Living Well, proposes a target of 100% of Bolivians have services of potable water and sewerage, understood under fair conditions and in balance and harmony to Mother Earth.

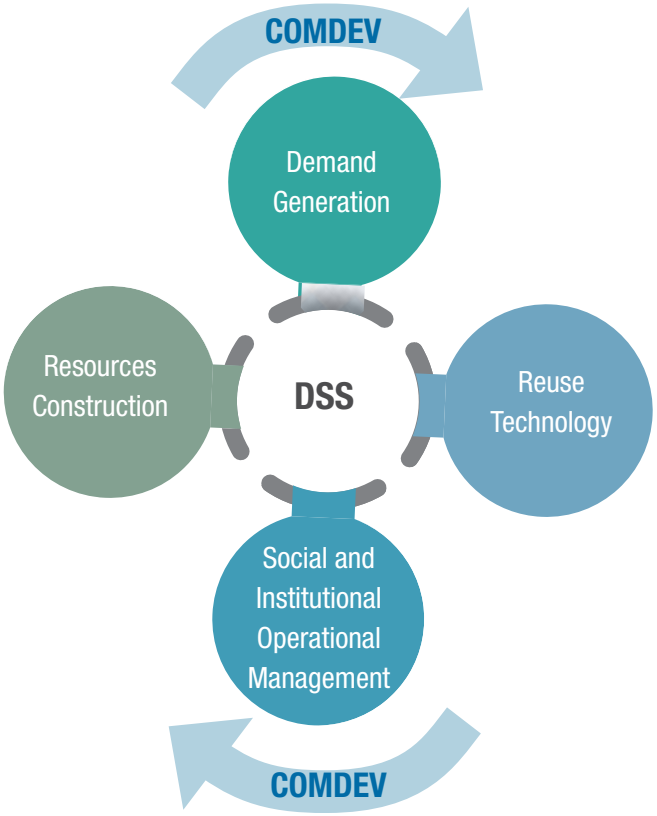
This challenge deserves involving the participation of multiple stakeholders, not only public but also private stakeholders and international cooperation agencies and organized manner, complying specific roles and joining efforts to contribute synergistically to the achievement of the goals outlined in the agenda 2025.

In such a case and in regard to basic sanitation which coverage is a still lag behind water services, a strategy for stakeholder's mobilization to generate interagency partnerships is relevant, because it must identify, articulate, strengthen and consolidate private and public stakeholders of cooperation as well as service providers, besides providing inputs for sanitation chain.

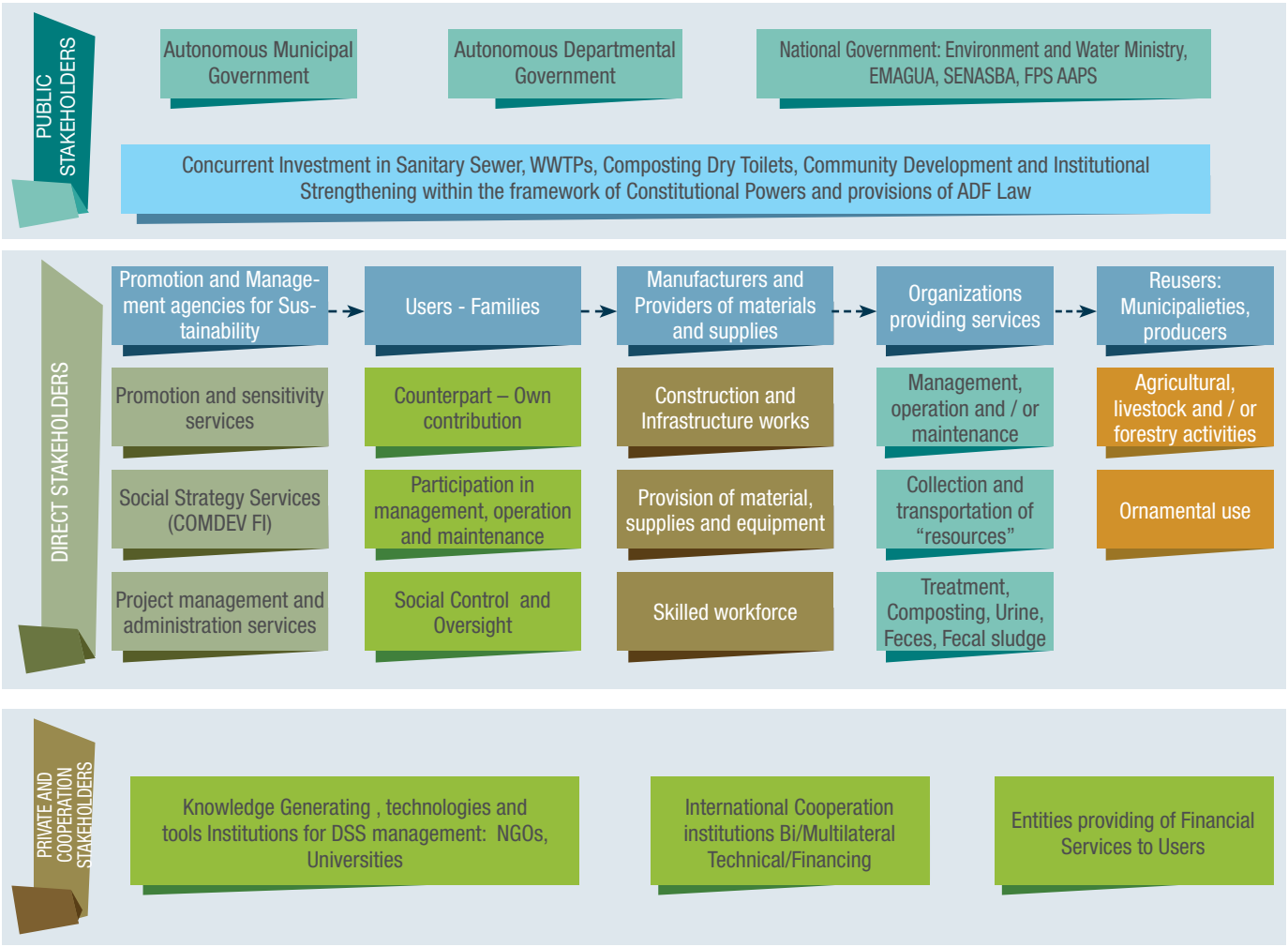
These stakeholders should be classified as suppliers of material and equipment, of treatment technologies, building services, of social strategies service, community development and institutional strengthening, financial service providers and agents for cooperation, taking into account the stages of the integral sanitation approach consisting of the following components

- Awareness and demand generation
- Building and technologies
- Social and institutional management and operation

Decentralized Integral Sustainable Sanitation Approach Components



KEY STAKEHOLDERS FOR DSS SUPPORT



- Cycle closure and reuse
- Development of social strategy, COMDEV and institutional strengthening as a transversal process to the preceding.

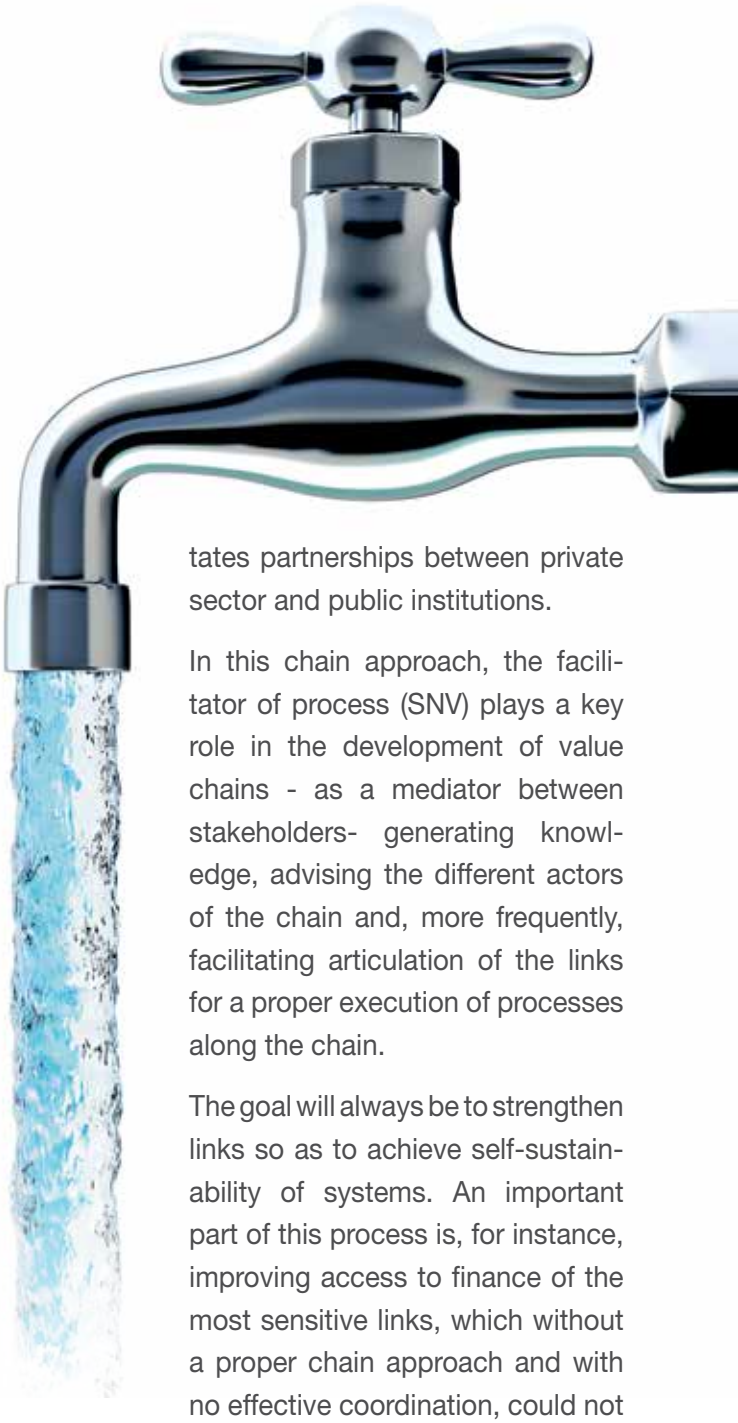
Therefore, the first step should be to identify stakeholders, articulate and consolidate a platform to generate agreements, transactions and businesses in perspective to generate synergies and economic mutual benefits, social and environmental sanitation.

The public stakeholders to municipal, departmental and national level in the framework of its competences and from municipal autonomous government holders of the exclusive competence of the sector, should generate the basic support to undertake the implementation and establishment of sustainable sanitation systems, through the allocation of concurrent public investment resources where efforts of other stakeholders will join.

Meanwhile, the Vice-Ministry of Drinking Water and Basic Sanitation, as head of the sector, will provide means to contribute to the strengthening and performance conditions of different stakeholders, in addition to providing the necessary certification for compliance with their roles.

DECENTRALIZED SUSTAINABLE SANITATION VALUE CHAIN

Horacio Barrancos B.
SNV Advisor



For SNV (Netherlands Development Organisation), value chain is a system of people, organizations and necessary activities to create process and deliver a product or service. Stakeholders included in the value chain can be producers, processors, traders and service providers. They transform natural resources, raw materials and components into a finished product delivered to the target customer. The value chain concept is based on the "organization" of the different actors and how they "interact" in its institutional environment.

A careful analysis of the value chain identifies opportunities for inclusive development, therefore it is vital to promote effective dialogue between stakeholders, which helps to identify the "limitations and opportunities" and, at the same time facilitates partnerships between private sector and public institutions.

In this chain approach, the facilitator of process (SNV) plays a key role in the development of value chains - as a mediator between stakeholders- generating knowledge, advising the different actors of the chain and, more frequently, facilitating articulation of the links for a proper execution of processes along the chain.

The goal will always be to strengthen links so as to achieve self-sustainability of systems. An important part of this process is, for instance, improving access to finance of the most sensitive links, which without a proper chain approach and with no effective coordination, could not access traditional financing offers as stakeholders (or links) independent of the system. Finally,

SERVICE VALUE CHAIN

the value chain approach entails addressing institutional and governance aspects of the system to promote a favorable environment for their development.

Therefore, the value chain approach brings a useful tool to study and design specific interventions that strengthen the operation of a system providing basic services as sensitive to human development as it is sanitation. In particular, Decentralized Sustainable Sanitation (DSS), analyzed from the chain approach, is configured as a system of multiple stakeholders, tasks, services and –hence- links.

DSS, by its nature, requires a vision that not only assess the integrity of the system, but also that each stage of sanitation, sustainability and growth can be studied, both from their approach to access to basic services, as well as from their perspective of sustainable solution for ecological sanitation[1].

1 DSS as ecological sanitation is an integral vision of natural cycles in which wastewater and human excreta are not considered as waste but as reusable resources. Sustainable sanitation uses the basic principles of nature to look for closing the cycles of water and nutrients, applying modern, sustainable and safe technologies.

It is relevant to point out that the concept of sustainability is broad and also refers to environmental sustainability, under two perspectives: i) negative effects which cause an accelerated reduction of water sources; ii) the negative effects caused by improper handling and disposal of excreta are deposited directly on the ground without any treatment. To do this, DSS systems are characterized by the minimum and effective use of water resources.

As it can be seen from this brief reference to the DSS and ecological sanitation, the topic at hand is, from every point of view, an enabling setting for analysis from the perspective of value chain.

Providing safe and sustainable sanitation services to people means more than simply provide a latrine or toilet. Indeed this approach has often failed. Instead, the DSS means understanding the contexts in which poor people live and how businesses (or cooperative) and local government are investing in developing opportunities along the entire value chain sanitation. Therefore from our approach the chain does not begin with the collection and storage of human excreta, but rather begins long before with a social process (if not economic) of self-conviction of the need to transform the traditional practices of latrines, septic tanks or open field use (all of which are harmful to health and the environment) for a more efficient, ecological and sustainable innovative system.

In the light of these considerations, we are able to describe the DSS value chain, which has been developed in Bolivia in recent years, taking as a study case the Composting Dry Toilets integrated to some collection, transport, processing and waste recycling systems. The following table outlines the chain in its various links and intervention strategy:

This table and graphical representation (Figure 1) shows that the sanitation chain is a sequence -more or less- organized activities in which different stakeholders can participate at each level (or link) and also various actors along the chain. That is to say in an analysis of industrial organization (basic sanitation industry) is perfectly possible that the process becomes progressively more efficient as technology improves (in each link) and market incentives are incorporated.

Thus for example, the basic diagram shown in Figure 1, can become as a Figure 2 scheme, where different suppliers and consumers of service along the chain, can create incentives for process improvement gains in efficiency, improved quality and fundamentally sustainability of the entire system.

If in the DSS sanitation industry, with Eco Dry Toilets technology interconnected by a collection, transport, treatment and reuse of waste system there would be a single operator, may occur cross subsidies schemes permanently -among links- and also opportunities for service improvement could not be displayed correctly. In a –theoretical- scheme as the Figure 2 is possible to visualize the features of supply and demand for each link and, consequently, to maximize efficiency.

If on the contrary, in the analysis of the entire chain and its parts, we find that sustainability were at risk by technological features (e.g., high system infrastructure costs), we can find and justify the existing advantages in market integration at different levels

This market analysis-but also the analysis of processes and institutional arrangements present in DSS- is accomplished if the system is correctly displayed as a value chain; where, in the absence of sufficient market incentives, a facilitator as SNV is a key agent to promote that stakeholders of the chain are located and establish steady relationships to enable the development and consolidation of the DSS system as a strategic response to conventional sanitation system.

> *"Sustainable sanitation uses the basic principles of nature to look for closing the cycles of water and nutrients, applying modern, sustainable and safe technologies".*

OUR PUBLICATIONS
NODE PROJECT 2014

Competence and regulatory analysis of basic sanitation sector and decentralized sustainable sanitation in Bolivia

Descripción: Exposure of analysis result and interpretation of the rules and the allocation of Competence relating to Basic Sanitation with special emphasis on Decentralized Sustainable Sanitation in the context of sector policies and the new stage of the Multinational Autonomous State and policies.

Market Study of Household Sanitation Solutions

Descripción: The aim of this study is to raise information that allows to understand and know the features of Sanitation Systems and the involved stakeholders; getting in addition data from product demand and sanitation services in the areas of project intervention, disaggregating information by ecological zones.

The study included a visit to predetermined áreas in the municipalities of Santa Cruz, Cochabamba, El Alto, Tiquipaya, Quillacollo and Riberalta.

Experience in Wastewater Treatment Plants at Cliza, Cochabamba Municipality

Descripción: Systematization of state of affairs and experience of managing wastewater treatment plants in 6 localities of the municipality (Cliza, Retama, Ucureña, San Isidro, Retama, Surumi and Huasacalle).

Implementation of Gender Equity Mainstreaming Strategy (GEM) in Sustainable Sanitation Decentralization

Descripción: Contains the report on the implementation of Gender Equity Mainstreaming Strategy (GEM) within the DSSN-Bolivia Project, through integral actions with its implementing partners: Sumaj Huasi Foundation, AGUATUYA Foundation and Water For People NGO. This project provides a platform for knowledge and impact generation on sustainable sanitation solutions.

Analysis of the environmental implications of "Decentralized Sustainable Sanitation Knowledge Node" Project

Descripción: This paper presents an analysis of the positive and negative Environmental Implications generated in the implementation of decentralized sustainable sanitation projects, Composting Dry Toilets and Wastewater Treatment Plants with the purpose of make recommendations for the future.

Integral Model for Sustainability of Wastewater Treatment Plants with Reuse of Treated Water

POPULATIONS UNDER 10.000 INHABITANTS

Descripción: Describe the components of the Integral Model of Sustainability, which are: generating demand; technology and construction; operational and social management; and reuse of resources as the basis of decentralized sanitation system. It addresses the issues of closing sanitation cycle, water reuse from a holistic perspective considering technical and environmental, social, economic and institutional aspects.

Systematization of the experience of Participatory and Social Management at Decentralized Wastewater Treatment Plants

Descripción: Its contents collect good practices of AGUATUYA Foundation over 5 experiences on Semi-decentralized Wastewater Treatment Plants construction, with accompaniment of COMDEV where the challenge on Decentralized Sustainable Sanitation is relieved.

The main conclusions of the study show the strengths and weaknesses of community organizations around sanitation management.

SNV

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