



SAIL IN COLOMBIA

**From Good Intention to
a Strategic Alliance**

**Evaluation of the Postgraduate
Capacity Building in Sanitary and
Environmental Engineering in
Colombia and the Wider Region
(ESEE II)**

**As part of
the SAIL Programme Evaluation**

Evaluation Team **SAIL** Programme for Colombia
Ms Doris Balvin
Dr Marc P. Lammerink

Peru/the Netherlands
June 2004

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Table of Contents

ABBREVIATIONS	5
ACKNOWLEDGEMENT	6
EXECUTIVE SUMMARY	7
KEY PROJECT DATA	9
1. BACKGROUND	11
1.1 SAIL Project Programme and the evaluation	11
1.2 The objective hierarchy	11
1.3 Working approach, analytical frame, the team	12
1.4 Evaluation methodology applied in Colombia	13
2. COLOMBIA AND ITS DEVELOPMENT POLICIES	15
2.1 Some international and national indicators	15
2.2 Specific policy priorities of the country	16
3. THE SAIL PROJECT: FROM IDENTIFICATION TO INCEPTION	17
3.1 History of the project	17
3.2 The partner organisations	18
3.3 Implementing agencies (partnering)	19
3.4 SAIL appraisal process	19
4. IMPLEMENTATION AND PROJECT ACHIEVEMENTS	21
4.1 Project objectives realised and related activities developed	21
4.2 Project and financial management	37
4.3 SAIL programme support	40
4.4 Partnership between Dutch institutions and local organisations	41
4.5 Factors influencing performance	43
4.6 Conclusions and recommendations to ESEE II project	43
5. KNOWLEDGE DEVELOPMENT AND SUSTAINABILITY	47
5.1 Knowledge and capacity	47
5.2 Recognition and authority	56
5.3 Staff commitment	56
5.4 Financial perspectives	57
5.5 Organisational/institutional strengthening	58
5.6 Conclusion	63
6. THE OBJECTIVE HIERARCHY FURTHER REVIEWED	67
6.1 Relevance in relation to Colombian development policy objectives	67
6.2 Relevance in relation to Dutch development policy objectives	68
7. LESSONS LEARNED AND PERSPECTIVES FOR THE FUTURE	73
7.1 General conclusions	73
7.2 Lessons learnt in relation to the co-operation strategy	74
7.3 Lessons learnt in institutional strengthening and the quality of Higher Education	76
7.4 Lessons learnt for the SAIL programme	77
7.5 Perspectives for the future	77

List of annexes

Annex 1: Terms of Reference	79
Annex 2: Analytical Frame	85
Annex 3: Activities during the evaluation mission and persons met	87
Annex 4: List of Staff trained as part of ESEE project	93
Annex 5: Theses under way and completed	95
Annex 6: Short courses 1999 – 2003	97
Annex 7: Grafics of main quantitative outputs	99
Annex 8: Bibliography	103

Abbreviations

ACODAL	Colombian Association of Sanitary and Environmental Engineering
ACUAVALLE	Association of Aqueducts and Sewage Systems of the Cauca Valley
AIDIS	Inter-American Association of Sanitary- and Environmental Engineering
APIS	Peruvian Association of Sanitary and Environmental Engineering
CEPIS	Pan-American Centre of Sanitary and Environmental Engineering, Peru
CINARA	Institute of Research and Development in Drinkable Water, Basic Sanitation and Conservation of the Water Resource
CIDIAT	Interamerican Centre of Development, Environmental and Territorial Research, Venezuela
COLCIENCIAS	Colombian Fund for Scientific Research and Special Projects of Francisco José of Caldas
CONPES	National Council of Economic and Social Politics
CRPML	Regional Center of Cleaner Production
CRQ	Regional Autonomous Corporation of the Quindío
CVC	Regional Autonomous Corporation of the Cauca Valley
DGIS	Directorate General for International Co-operation
DUT	Delft University of Technology
EIDENAR	School in Engineering of Natural Resource and of the Atmosphere.
EMCALI	Municipal Public Company of Cali
ERIS	Regional School of Sanitary Engineering and Water Resources, Guatemala
ESEE	Education in the Field of Sanitary and Environmental Engineering
EST	Environmental Science and Technology
EU	European Union
FGDi	Dynamic Filtration
FiME	Multiple stage Filtration
GAVIM	Governfaculty, Poverty, Gender, Institutionality and Environment
GTZ	German Foundation for Technical Co-operation
GWP	Global Water Partnership
ICFES	Colombian Institute for the Development of Higher Education
ICID	International Committee for Irrigation and Drainage
IHE	International Institute for Hydraulic, Infrastructural and Environmental Engineering
IHS	Institute for Housing and Urban Development Studies, Rotterdam, The Netherlands
IIUR	Institute of Research, University and Region of the UNSAAC, Cusco, Peru
INAT	National Institute of Land Adaptation of Colombia
IRC	International Reference Centre for Community Water Supply and Sanitation
IWA	International Water Association
IWMI	International Water Management Institute
NGO	Non-Governmental Organisation
OMS	World Health Organisation
OPS	Pan-American Health Organisation
PAEs	Team learning Projects
PMC	Project Models of the Cauca river
PmL	Cleaner Production
PoWER	Partnership for Water Education and Research
RUT	Irrigation District of Roldanillo – The Union – Bull
SAIL	Consortium of International Education Institutes and Wageningen Agricultural University
SAMTAC	South American Technical Advisory Committee
SEE	Sanitary and Environmental Engineering
SPP	SAIL Projects Programme
STEPS	Program of Graduate degree in Sanitary and Environmental Engineering; Univalle, Cali, Colombia
STREAM	Study of Resource Development Centres
UNDP	Development Programs of the United Nations
UNESCO	United Nation Organisation for Education, Science and Culture
UNICEF	United Nations Programs for the Childhood
UNIVALLE	University of the Valley, Cali, Colombia
TOR	Terms of Reference

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Cali (Colombia), June 2004

The Evaluation Team

Executive Summary

The SAIL Foundation consists of 6 institutions of higher international education in The Netherlands. It was set up in 1994 to implement the SAIL Projects Programme for the Netherlands Government and to date, over 45 projects have been implemented worldwide. One of these is the Postgraduate Capacity Building in Sanitary and Environmental Engineering in Colombia and the Wider region (ESEE II).

Since almost 30 years a relation exist between the Universidad del Valle (UNIVALLE, Cali, Colombia) and various Dutch organisations. In 1986, the UNIVALLE looked for co-operation with IHE (Netherlands) in order to support the institutional development of its postgraduate training capacity. Little by little the idea emerged to establish on the long run a Regional Centre of expertise for training and research on water supply and sanitation. The actual ESEE project comprises of two phases and received funding through SAIL. The first phase from 1992 to 1996 concentrated on establishing the postgraduate programme in Sanitary and Environmental Engineering with specialisation options and a master's programme. The educational training of the staff, the improvement of the infrastructure of the laboratories and of computer resources was undertaken. The programme started with the development of international short courses. Also research and inter-institutional relationships were strengthened.

The Consolidation phase (from 1996 to 1998) was used for the improvement of the administration and supervision of the masters' theses, the development of a strategy of conferences and international short courses (the events "Agua" are a good example). The master and specialisation programme were improved by increasing the number of elective subjects. Several doctorate studies began, which were co-financed by the project. During this phase the formation of a 'critical mass' began, by elevating the level of research activities. In 1998, SAIL approved the project's second phase, which aimed at expanding the postgraduate capacity building to the wider region.

The second phase is a joint co-operation between UNIVALLE, IHE, IHS, and DUT (all of The Netherlands). Its duration after budget-neutral extension is until June 2004. The present evaluation mainly comprises the second phase.

From the first to the second phase, significant improvements can be noticed in the implementation, with regard to: ownership; the complementary role of both the partners involved; the sharing of responsibilities; the increased human capacity of EIDENAR and Cinara and the development of mutual trust.

The global management of the project implementation by IHE and Cinara, has clearly produced synergy between the two partners. The two organisations had been flexible enough to adapt to the needs of both sides.

Management capacities have improved, as well as planning, training and planning capacities to administer postgraduate programmes and research projects and Cinara has become an institute for academic exchange of regional importance.

The ESEEII is a good example of a successful programme of university capacity building, teacher training and research development under SAIL. It has partly concentrated its activities on postgraduate university education and problem-oriented research. As such it has gained good recognition as an important counterpart in the Cauca Valley region on subjects related to water and sanitation. ESEE II clearly achieved the SAIL objective to contribute to an increase in the quality and quantity of educated professionals, i.e. *human resource development*, as well as *institution building* in Colombia and to a lesser extent in the region.

The education has been appropriate in relation to the responsibilities of professionals and professors and professionals in the wider region. It also has been important for the University of Valle, to get experience in and expand on multi-and trans-disciplinary co-operation within the Cauca Valley.

The programme has yielded considerable results in terms of the *Institutional Development* criterion. The project has contributed to improved management of the educational processes; staff has been further trained and are well prepared for the organisation of postgraduate education and masters' degree programmes, as well as for research. In its consultancy and network activities, especially Cinara has gained international recognition. An appropriate infrastructure has been put in place in the Laboratories of the School of Engineering and the experimental stations of Ginebra and Puerto Mallarino, which function both as research centres and experimental design places where not only researchers are coming but also for example mayors of municipalities.

The need for well-trained professionals in SEE is clearly established and UNIVALLE can satisfy this need. The activities and objectives of the programme are directly relevant to the main development policy directions of the Colombian Government. The demand for the type of postgraduate training that the UNIVALLE has developed for SEE is expected to increase considerably in the coming years as an important strategy to improve the sanitary conditions of the poor. The investment made in the ESEE II project under the SAIL programme is fully justified. Development and promotion of different aspects of SEE can affect the lives of women and men living in the rural and peri-urban areas of Colombia. From this perspective, the ESEE II project is relevant in relation to poverty alleviation and in relation to the objective of gender & development. In general, the project is also in line with policy priorities of the Netherlands Development Co-operation that promotes, amongst other goals, poverty alleviation, gender in development and international education.

The relevance has been particularly high because the programme made knowledge and experiences available down to community level. The project has reached many rural and peri-urban communities in the region. During ESEE II, the programme has indeed grown **'from good intentions into a strategic alliance'**.

Key Project Data

Project Name	Postgraduate Capacity Building in Sanitary and Environmental Engineering in Colombia and the Wider Region
Acronym	ESEE II
Location	Colombia, Cali
Targeted Region	In principle the Andean Region and Central America, with the possibility to enlarge to the whole of Latin America and Caribbean.
Executive Agency	Universidad del Valle (UNIVALLE): Faculty of Engineering and the Institute of Cinara
Implementing Institutes	International Institute for Infra-structural, Hydraulic and Environmental Engineering (IHE) in co-operation with Institute for Housing and Urban Development Studies (IHS) and Delft University of Technology (DUT)
Contract Period Phase II	1 January 1999 – 31 December 2002
Final Evaluation First Phase	June 1998 Mid term evaluation Phase II: None. Organisation has done 2 self-evaluations.
Extension (budget neutral)	First: 1 January 2003 – 31 December 2003 Second: 1 January 2004 – 30 June 2004
Extension (new budget)	None
Total Project Budget	NLG 5,377,113 (equivalent € 2,403,608)
Contribution SAIL	NLG 2,377,113 (equivalent € 1,062,587)
Contribution Univalle	NLG 1,000,000 (equivalent € 447,007)
Other Budget Contributions	NLG 2,000,000 (equivalent € 894,015)
Financial Audits	05/07/02, 12/07/01 (Price Waterhouse Coopers) 31/05/00 (Internal Administration Service of the Ministry of Education, Culture and Science)

Short description

The co-operation between IHE and Univalle began in 1992 with the objective to establish on the long term a Regional Centre for training and research to contribute to the development of the water supply and sanitation sector in Colombia and in the other countries of the Region. The Agreement was structured based on the academic and research experience in the field of the Sanitary and Environmental Engineering of the Universidad de Valle in Cali, Colombia. Previous to the beginning of the Project in 1992, the Dutch Government already contributed through the support to development research projects, executed jointly by Univalle and Dutch institutions such as: IHE, Delft Technology University (DUT), The International Reference Centre, IRC, Agricultural University of Wageningen and Haskoning. Some of these activities date back to approximately 30 years.

The Project comprises of three stages: ESSE I, 1992 – 1996 (Agreement Univalle – IHE/DUT); Consolidation, 1996 – 1998 (Agreement Univalle – IHE/DUT); ESEE II, 1999 – 2002, with budget neutral extension first to end 2003 and later to June 2004 (Agreement Univalle – IHE/HIS). The institution leader of this Project, for the Dutch part has been the IHE. IHS, with headquarters in Rotterdam, entered in the second phase.

During the first phase of the Project (ESSE I, 1992 – 1996) the start was made with a Graduate Programme in Sanitary and Environmental Engineering, with the two options of Specialisation and Master's degree.

The staff was trained and the infrastructure of laboratories and computer equipment for educational and research purposes was improved. Also research was strengthened as well as interinstitutional relations. Several international short courses were carried out. The Phase of Consolidation (1996 – 1998) was used to improve the administration and supervision of the Master thesis, the improvement of the computer resources, the development of conferences and short courses, improvement of the Graduate courses and the development of the concept of "critical mass" with the purpose to optimise and to analyse the administration and supervision of the research. In this context several studies of PhD began, some of them with co-financing of the Project.

The current ESEE II, initially foreseen for the period 1999 – 2002, has been oriented towards: i) the organisation of the research programmes and its subsequent training; ii) the regionalisation of the activities through alliances and development of projects with institutions of countries in the Region; iii) reaching of sustainability of the faculty in the activities in such a way that IHE and UNIVALLE are in the capacity of continuing the co-operation, based on externally funded activities.

From its initial phase, in 1992, the Project has operated based on the strategies of "seed resources" and "co-financing". That is how the objectives of the Project has been accomplished: it was based on a rational use of the financial resources, on making use of the own contributions of Univalle and on negotiating additional external resources at local, national and international level. This strategy has made it possible to continue with the project until June 2004, without modifying the value of the assigned total budget.

Most of the commitments of the current phase (ESEE II, 1999 – 2004) have been completed. Among the pending activities are the consolidation of the curricular reformation of the graduate degree Programme in Sanitary and Environmental Engineering, the finalisation of the doctorate studies in IHE of some of the educational staff of Univalle and the strengthening of the relationship with alumni of the Graduate Programme in Univalle, which includes professionals of different regions of Colombia and of 8 countries of the Latin American and Caribbean Region (Mexico, Nicaragua, Honduras, Dominican Republic, Venezuela, Ecuador, Peru and Bolivia). Additionally, it is considered important to continue strengthening the activities of the Strategic Alliance Univalle – IHE, through the development of joint initiatives and programmes in the future.

1. BACKGROUND

1.1 SAIL Project Programme and the evaluation

The SAIL Foundation, consisting of 6 institutions of higher international education in The Netherlands¹, was set up in 1994 to implement the SAIL Projects Programme (SPP) for the Netherlands Government. Since its inception in 1996, this programme has spent approximately 20 million guilders (EUR 9 million) annually, for which over 45 projects have been implemented worldwide.

In the late-1990s, the Netherlands Government called for innovations in the field of International Education (IE). As a consequence, since the start of 2003, new programmes have been replacing the existing IE programmes, including the SAIL Project Programme, which is envisaged to end by mid-2004. After almost 10 years of SAIL experience, the SAIL Foundation felt it appropriate to identify the "lessons learned" at programme level, so as to benefit new and other programmes in the educational sector. Moreover, due to the cessation of the SAIL Programme, a number of the projects are facing an early withdrawal of donor funding and support, which calls for assistance in determining the road ahead and obtaining funding from other sources. Hence, the SAIL programme evaluation will draw upon the review of a number of these and other selected projects², as well as on additional desk research and earlier evaluation reports. The evaluation seeks to establish whether the SAIL Programme and its projects have contributed to achieving the specific and overall objectives of the IE programme and focuses on lessons learned in this respect.

This report deals with the evaluation of one of the selected projects only, namely, the 'Postgraduate Capacity Building in Sanitary and Environmental Engineering in Colombia and the Wider Region Phase 2' (ESEE II) and seeks to serve the Colombian and Netherlands partners under ESEE II. The evaluation results will become an integral part of the overall programme evaluation to be completed by mid-2004. The following paragraphs of **Chapter 1** explain the objective hierarchy and evaluation frame, as well as the working methodology as applicable to Colombia and to the other project reviews. **Chapter 2** gives an overview of the development context of Colombia, while **Chapter 3** briefly describes the ESEE II project and the different implementing partners. **Chapter 4** elaborates on the achievements of the ESEE II project. **Chapter 5** presents the findings with regards to the sustainability of the project achievements and **Chapter 6** reviews the project achievements in relation to the SAIL programme objectives and the Colombian and Netherlands policies. In **Chapter 7**, some recommendations and perspectives for the future are expressed.

1.2 The objective hierarchy

The SPP mainly seeks to achieve two objectives:

- To strengthen institutions of higher education (in particular post-graduate training, higher professional education and related research) and
- To develop human resources so as to enhance educated professionals, in terms both of number and quality.

¹ The International Institute for Infrastructural, Hydraulic and Environmental Engineering (IHE/Delft), the Institute for Housing and Urban Development Studies (IHS/ Rotterdam), the Institute of Social Studies (ISS/The Hague), the International Institute for Geo-Information Science and Earth Observation (ITC/ Enschede), Maastricht School of Management (MSM) later joined by Wageningen University and Research Centre (WUR).

² Criteria were developed for that purpose.

These educational objectives are to contribute to a sustainable knowledge infrastructure and a broad human resource base in the country of co-operation, which is assumed to have an effect (direct or indirect) on poverty alleviation, which is one of the principal aims of the Netherlands' international education and foreign policies. Equal access to quality education for both genders, for ethnic minorities and the economically under-privileged, as well as combating environmental degradation, are among the critical elements of the objectives to be addressed under the SAIL interventions³.

This so-called "objective hierarchy" constitutes not only the framework in which the SAIL project interventions have taken (or are still taking) place, but also the immediate context for this integrated evaluation. Three research questions for the evaluation are defined:

- Did the project activities contribute to achieving the specific project objectives?
- Did the individual as well as the joint SAIL-projects contribute to achieving the objectives of the SPP?
- To what extent did the SPP, through its projects, contribute to the aim of Netherlands IE policy (the umbrella for the SAIL programme) and to the national development aims pursued under the project by the co-operating country?

The findings are to be assessed in terms of sustainability, relevance, effectiveness and efficiency. These issues and other aspects of the evaluation are further expounded in the Terms of Reference (ToR).

1.3 Working approach, analytical frame, the team

It naturally emanates from the chosen evaluation context (the objective hierarchy) that data collection and analyses are to be carried out bottom-up, working upwards from the projects' achievements to the programme results, assessing the possible effects on the general objectives of international education programmes and eventually, on poverty reduction.

Enabling aggregation and comparison of the world-wide obtained evaluation data and results, key issues emerging from the objectives, subsequent evaluation benchmarks and specific questions (based upon the project interventions) related to sustainability of the faculty, relevance, effectiveness and efficiency are developed at both project and programme level and reflected in an analytic frame. Attention is also paid to specific development objectives pursued by the national project institutes and the country itself, presumably always running parallel and complementary to the SAIL project and programme objectives. The framework, the identified benchmarks and the questions related to them are being used as guidelines, duly recognising the many different modalities of SAIL projects.

Four Netherlands evaluation members, constituting the core Sail Evaluation Team, are undertaking the programme evaluation based upon – as explained above – project evaluations. They will work in country teams of one Netherlands national and one member from the region or from the programme's host country.

The 11 field visits (out of the more than 40 SAIL projects) are being executed in a time-frame of 12 months, working in clusters (the 1st cluster includes 3 projects, the 2nd cluster 4 evaluations and the 3rd cluster 2 projects)⁴.

³ Financial agreement between SAIL and the Minister for Development Co-operation, November 1996

⁴ Projects evaluated in the 1st cluster located in Peru, Ghana and Zimbabwe, followed in the 2nd cluster by Vietnam, Ghana, Ethiopia, Tanzania and China and in the 3rd cluster will be in Vietnam and Colombia.

This last cluster is devoted to the fine-tuning of the findings regarding the project and the programme and to extending the conclusions and preliminary recommendations. These final evaluation results, together with desk and document studies, will establish the foundation for the general judgement on relevance, sustainability, effectiveness and efficiency of the SAIL Project Programme in the context of the overall development aim: poverty reduction.

The working approaches applied by the various country teams for data collection and assessments are, in principle, the same everywhere. In depth-interviews, focus group discussions with staff, trainees, graduates, resource persons and others, in addition to plenary working sessions and participatory assessments methods, are being employed on the basis of the consideration that self-assessment gives the best learning spin-off.

1.4 Evaluation methodology applied in Colombia

The assessment team in Colombia consisted of Ms Doris Balvin, International Consultant on Environmental Issues, who was also part of the evaluation team in Peru and Dr Marc P. Lammerink of the Netherlands, a member of the core evaluation team of the SAIL Programme.

The assessment was developed under the guidelines designed by the core evaluation team of the SAIL Programme and included 4 levels of analysis:

- The faculty of the Univalle to continue the efforts initiated by the project, i.e., the achieved institutional strengthening. This is analysed starting from the formal recognition of the authority of the departments of Univalle and Cinara, its strengths, in economic terms, the knowledge and skills achieved by the teachers, up to the Univalle's interest in continuing with the programme;
- The process of knowledge development and the accessibility of knowledge-upgrading and liaison with others, access to the target groups, the social relevance of the knowledge, as well as its support in infrastructure and organisation;
- The incorporation in the educational programmes of changes of awareness, the attitudes, the knowledge and the skills acquired by the students; and
- The organisational changes and institutional strengthening attained as a result of the project's interventions.

Goals of the assessment:

- To assess how far the project has achieved the project objectives.
- To obtain lessons learned from the accumulated experience in the development of the ESEE II.
- To determine the development level of the selected projects and, if necessary, to make recommendations for the future.

The assessment was performed in accordance with the agenda established in the Terms of Reference and the availability of the interviewees. The agenda and the list of interviewees can be found in Annex 3 of this report.

2. COLOMBIA AND ITS DEVELOPMENT POLICIES

2.1 Some international and national indicators

- A country brief -

Colombia⁵ is located in North-western South America. It is bordered by Ecuador, Peru, Panama, Brazil and Venezuela. This Andean country of more than 1.1 million square kilometres has three high mountains ranges and enjoys enormously varied types of ecosystems. Colombia's gross domestic product (GDP) is valued 86,6 billion US dollars or 2,090 USD per capita. The GDP is lead by services which account for 41% of this GDP, followed by agriculture with 14.1%, manufacturing 13,9%, commerce 10.7% while energy and mining contributes 7.3%. Manufacturing is concentrated around the cities of Medellin, Bogota, Cali and Barranquilla, and is dominated by large private conglomerates. Exports are dominated in value by oil, coal and coffee. More than 30 million people live within this Andean region of which almost 76% lives in urban areas. Within the economic active population 23% works in agriculture, 19% in industry and 58% in services. Life expectancy is 71.8 years, the combined schooling enrolment ratio is 71%, the number of people living under 1 dollar a day is 14.4% while almost 60% of Colombians live under the poverty line and 23% under the extreme poverty line. The unemployment rate hovers around 20%.

After, 40 years of internal armed conflict and several attempts at negotiating peace, Colombia remains immersed in violence, with the State pitted against two well-armed guerrilla organisations, the *Fuerzas Armadas Revolucionarias de Colombia* (FARC) and the *Ejercito de Liberacion Nacional* (ELN). Furthermore, there are the paramilitary or 'self-defence' groups. In 2002 the country registered around 28,780 homicides, 111 slaughtered, while 1,352 persons forcibly disappeared and some 373,020 were internally displaced. During the same period 32 attacks on municipalities and 2,942 kidnappings were registered. Also in 2002, the country had 100,000 hectares of land planted with coca, partly financing the different armed groups. According to expert analysis, money from the drug trade represents 70% and 42% of the paramilitaries' and the guerrillas' income, respectively. The entire drug trade is estimated to be worth around 2.3% of GDP.

- Brief on water and sanitation situation in the Region -

The breach in the economic and social development grows to quick steps and is very unevenly spread when the conditions of its inhabitant's lives are analysed, according to the access to basic services. For example in the Pacific region of Colombia, the sewage system is covering 36%. That means, that 64% of the households do not have connected toilets to the sewage system. The garbage's collection is of 41%.

In general, close to 92 million people in Latin America do not have access to safe water supplies, while around 128 million live without basic sanitation facilities, in spite of the investments made in Latin America and the Caribbean during the final decades of the 20 th century (Global Report 2000). The control of contamination is still in the in/out stage; with estimates showing less than 5% of wastewaters receive some type of treatment. In the urban areas of Colombia 86% of the population is served with water. However, still the peri-urban and rural areas are very badly served with public services, like treated or safe drinking water (about 39% is not connected). The situation in relation to a sewage system is even worse. About 5.5% of illness has a direct relation to bad drinking water and sanitary conditions. Main related illness is diarrhoea.

⁵ Based on: Human Development Report for Colombia, 2003 'A cul-de-sac with ways out', UNDP, 2003

Restricted human resource capacities, especially at the postgraduate level, stand out as one of the main limitations preventing any improvement in these conditions. Consequently, this situation constraints also the capacity of Research and Development. Furthermore, the full-scale implementation of projects providing appropriate solutions to the variety and complexity of water, sanitation and environmental problems in the region is limited.

2.2 Specific policy priorities of the country

At the Earth Summit in Rio de Janeiro in June 1992, world leaders committed themselves to a comprehensive programme to bring sustainable water supply and sanitation services to the hundreds of millions of people who currently lack them. At the summit all States and support agencies were urged to implement activities aiming for universal coverage outlined in Agenda 21, a strategy for sustainable development in the 21st Century. A guiding principle of Agenda 21 is: "Community management of services, backed by measures to strengthen local institutions in implementing and sustaining water and sanitation programmes". The activity list includes numerous measures to bring about effective community management.

Since the new Political Constitution of 1991, the way basic services are delivered has radically changed. The Public Sector does not any more directly deliver services but should guarantee that services are delivered in an efficient and effective way.

At the beginning of the 1990s, President Gaviria summoned a 'commission of the wise' made up of distinguished Colombians from the country and abroad. After analysing the country's problems, they came to the conclusion that what needed to be done was to develop a critical mass of high quality scientific and technical human resources. At that time the indicators in Colombia for university graduates were still at an all time low. The conclusions in the so-called 'road map' provided the framework for human resources training, a strategy put into effect by COLCIENCIAS.

During the Samper government (1994 to 1998) the strategy was implemented. The government put together a grants plan to train graduates from academic institutions abroad and have them return to contribute to the country. Six open competitions were held in the Samper government and some 1,000 professionals were trained in this way.

With the Pastrana government from 1998 to 2002, the process was stalled. The COLCIENCIAS budget was reduced, and no more open competitions⁶ were held. The worst thing was that the government issued a disposition, which made it very difficult to attract students in the region from outside of Colombia because their titles needed to be officially approved⁷.

The current government is planning to make COLCIENCIAS re-assume its previous leadership, through bilateral credits now being negotiated. As such the ESEE programme has been developed in a context of growing awareness of the problems with waste and sanitation in the smaller communities of Colombia and the region and in a context of growing awareness and varying policies related to the necessity to improve the educational level of professionals.

⁶ In this difficult process, the existence of the agreement was crucial, because it made it possible to go on working and survive the crisis.

⁷ The process of official recognition of the titles took a whole year, making it impossible to promote the postgraduate programme outside the country.

3. THE SAIL PROJECT: FROM IDENTIFICATION TO INCEPTION

3.1 History of the project

The process of identification and subsequent proposal development between IHE and Univalle began around 1986. IHE was asked for because of its experience in international programmes. The implementation started in 1992 with the objective to establish on the long run a Regional Centre of expertise for training and research to contribute to the development of the water supply and sanitation sector in Colombia and in the other countries of the Region. The Agreement was structured based on the inherent academic and research experience in the field of the Sanitary and Environmental Engineering of the Universidad del Valle in Cali, Colombia. Previous to the beginning of the Project in 1992, the Dutch Government already contributed through the support to research and development projects, executed jointly by Univalle and Dutch institutions such as: IHE, Delft Technology University (DUT), The International Reference Centre, IRC, Agricultural University of Wageningen and Haskoning. Some of these activities date back to approximately 30 years.

Some factors of Success during identification

According to the Gerardo Galvis, ex-director of Cinara: 'Five project proposals have been elaborated between 1986 and 1992. It implied negotiations with the university itself, with the Colombian government and with IHE and the Dutch government. A factor of success was the patience and trust of the University administration to participate in such a slow identification and formulation process. However, in that long formulation process some of the real nice ideas from the start could not be maintained. For example, it was hoped to have a flexible offer of modules that allowed students to participate in a variety of short courses, but for approval of the proposal by the Colombian Government we had to develop a structure based on semesters. The paradox is that this can change back again by pressure of the same government.

This type of project formulation is a process that takes time. It implies changes of the organisational culture on both sides.

Interview in Lima, June 2004

The Project comprises of three stages: ESSE I, 1992 – 1996 (Agreement Univalle – IHE/DUT); Consolidation, 1996 – 1998 (Agreement Univalle – IHE/DUT); ESEE II, 1999 – 2002, with budget neutral extension first to end 2003 and later to July 2004 (Agreement Univalle – IHE/HIS). The institution leader of this Project, for the Dutch part has been the IHE. IHS, with headquarters in Rotterdam, entered in the second phase.

During the first phase of the Project (ESSE I, 1992 – 1996) the start was made with a Graduate Programme in Sanitary and Environmental Engineering, with the two options of Specialisation and Master's degree. The staff was trained and the infrastructure of laboratories and computer equipment for educational and research purposes was improved. Also, research was strengthened as well as inter-institutional relations. Several international short courses were carried out. The Phase of Consolidation (1996 – 1998) was used to improve the administration and supervision of the Master thesis, the improvement of the computer resources, the development of conferences and short courses, improvement of the Graduate courses and the development of the concept of "critical mass" with the purpose to optimise and to analyse the administration and supervision of research. In this context several PhD studies began, some of them with co-financing of the Project.

The current ESEE II, initially foreseen for the period 1999 – 2002, has been oriented towards: i) the organisation of the research programmes and its subsequent training; ii) the regionalisation of the activities through alliances and development of projects with institutions of countries in the Region; iii) the attainment of sustainability in the activities in such a way that IHE and Univalle are in the capacity to continue the co-operation, based on externally funded activities.

From its initial phase, in 1992, the Project has operated based the strategies of "seed resources" and "co-financing". That is how the objectives of the Project has been accomplished, based on a rational use of the financial resources and making use of own contributions of Univalle and negotiating additional external resources at local, national and international level. This strategy has made it possible to continue with the project until June 2004, without modifying the value of the assigned total budget.

Most of the commitments of the current phase (ESEE II, 1999 – 2003) have been completed. Among the pending activities are the consolidation of the curricular reformation of the graduate degree Programme in Sanitary and Environmental Engineering, the finalisation of the doctorate studies in IHE of one of the educational staff of Univalle and the strengthening of the relationship with alumni of the Graduate Programme in Univalle. Alumni include professionals of different regions of Colombia and of 8 countries of the Andean and Central American Region (Mexico, Nicaragua, Honduras, Dominican Republic, Venezuela, Ecuador, Peru and Bolivia).

Lately, the Univalle-IHE co-operation has matured into a Strategic Alliance to provide support to the water, sanitation and environmental sector of the Region. It is considered important to continue strengthening the activities of the Strategic Alliance Univalle – IHE. In order to sustain the institutional co-operation between Univalle and UNESCO-IHE, Univalle has joined the UNESCO-IHE Partnership for Water Education and Research (PoWER). The 17 members of this unique partnership have committed themselves to develop joint educational modules and to promote joint research.

Strategic Alliance Univalle – IHE

The Univalle-IHE strategic Alliance aims at solving the current limitations and problems in the water, environmental and sanitation sectors in Latin America. To be able to address these problems, via an Integrated Water Resources Management Strategy, the water sector needs efficient institutions, skilled professionals, sustainable technologies and an appropriate management of these resources. The Alliance offers its expertise and capacities in the water sector to professionals and institutions in the Region, including the potential of inter-institutional co-operation in implementing joint activities. The services provided are guided by the concepts of Sustainability, Learning through Teamwork, Cleaner production and Integrated Water Resources Management. Activities include Postgraduate Training (both master courses and short courses) Development of tailor-made training programmes, Applied research and development projects, Advisory and Consultancy Services, Information Services. Activities aim at better services to society and improvement of the quality of life of people in the Region.

The Alliance is based on the joint strengths of both partners and their wider networks, its experiences, its qualified international staff and proven track records in applied research projects for the water sector. The experiences in working with communities and real-scale demonstration projects are integrated in its training and research.

3.2 The partner organisations

Universidad del Valle (University of the Valley) was founded in 1945 and is the main centre of higher education in South-western Colombia. It contains of a regional system with two main locations in Cali and 12 additional sites in cities throughout Colombia. Univalle offers a wide range of graduate and postgraduate degrees and programmes and carries out research and development projects and specialised consultancy services.

It comprises of eight faculties with 54 academic units and approximately 180 degrees and PhD programmes in Science and Engineering. More than 20,000 students receive university education and the amount of alumni is some 25,000. The Academic Units directly related to the Convenio between Univalle and IHE are the Institute for Water & Sanitation (Cinara) and the School of Environmental and Natural Resources Engineering (Eidenar), established since 2000. This School is a fusion between two Departments of the Faculty of Engineering, called: Department of Chemical and Physiological Processes and Department of Mechanical of 'Fluidos'. Cinara is a University Institute since 1990 and is involved in research and development related to water and sanitation and conservation of water resources.

3.3 Implementing agencies (partnering)

- Institute for Infra-structural, Hydraulic and Environmental Engineering (IHE), Delft -

The IHE-Delft, established in 1957 by the Delft University of Technology (DUT), is based in Delft. It is firmly rooted in the Dutch water sector and is part of a wider international knowledge network. It is an international institute for scientific research and postgraduate education and training in the fields of water, environment and infrastructure. The Institute is a 'partner in action' in the developing countries, through solution-oriented research, education and capacity building. It has conducted international postgraduate courses since its establishment, in which it offers also PhD programmes in water, environment and infrastructure, aiming at developing a problem-solving attitude, talking into account the multi-disciplinary setting of problems and aiming at achieving sustainable solutions. IHE has trained more than 12.000 engineers and scientists from over 120 countries around the world. Since 2003, it has become the UNESCO-IHE Institute for Water Education.

- Institute for Housing and Urban Development Studies (IHS), Rotterdam -

The IHS, established in 1958 was involved in urban development in Rotterdam after World War II. Since then it evolved from training institute into a postgraduate institute, aiming at strengthening local capacities in housing and urban development. Its focus is on urban management, urban environment and urban housing. IHS offers training and education, advisory service and research directed at the developing world. IHS core competence lies in analysing needs and options for staff training, in the design, implementation and management of training programmes and in conducting policy-relevant research programmes.

It has to be noted that the participation of IHS was limited in the first years of ESEE II to only a few activities. The reason was twofold: 1) there was lack of staff capacity with IHS in relevant fields, and 2) due to the thematic re-orientation of IHS at the time, water no longer was considered a priority field. This issue was discussed between IHE and IHS and both parties agreed that the role of IHS in the project would become minor.

3.4 SAIL appraisal process

The ESEE programme was evaluated both in 1995 and in 1998. The report, presented in April 1995, showed a very positive balance in relation to the results of the Postgraduate programme and other aspects of the Agreement. However, some improvements were proposed, most of which were already mentioned in the self-evaluation. These recommendations have been taken very seriously and were addressed accordingly.

Recommendations were related to good advertising/promotion, continuous search of funds to ensure the financial structure and fellowships, inclusion of community and waste minimisation and cleaner production aspects, increase in the number of elective courses, research findings presented in international conferences and published in referred journals, substantial improvements in the facilities of postgraduate training and research in Univalle and Cinara, and the creation of research capacity at pilot and full scale in Ginebra. The recommendations in 1995 to set up alumni network and to improve English proficiency is still pending. Ever more staff has published in referred scientific journals, although in that case English is also a hindrance.

In 1998, SAIL commissioned an evaluation and appraisal mission to Colombia to evaluate ESEE I and to appraise the ESEE II project. Based on the findings of the mission several changes have been made to the proposal for ESEE II, during the consolidation phase of the project between 1997 and 1998. As such its recommendations have been carefully addressed in the project document for the ESEE II.

Recommendations from the second evaluation and appraisal mission are related to the following fields:

- Set up of an alumni network;
- Implementation of topical evaluations, for example on long graduating process of students and possible improvements;
- Evaluation with graduates of beneficiary effects of postgraduate;
- Improve proficiency in English of Univalle staff;
- Make use of positive experiences with short courses during Aqua Conference of 1998 for future conferences;
- Postgraduate programme considered a national medium for capacity development: continue good relations with national end departmental and sector agencies and possibly the market sector;
- Draw up a plan/strategy for postgraduate capacity development for national policy makers.

4. IMPLEMENTATION AND PROJECT ACHIEVEMENTS

This chapter will assess the realisation of the ESEE II project against the objectives set out. Finally, some lessons learned from the accumulated experience in the development of the ESEE II will be summarised.

4.1 Project objectives realised and related activities developed

The ESEE I aimed at establishing a postgraduate education and research programme in the field of Sanitary and Environmental Engineering. The project achieved the establishment of an annually organised postgraduate programme at the level of Especialista (1 year) and Maestria (1.5 years). Additionally, the project organised four short courses and an international conference⁸.

The overall objective of the ESEE II project is to upgrade and develop the human resource, research and institutional capacity in Colombia and the wider region, in the Water Sector (WS) in general and in the sub-sector of Sanitary and Environmental Engineering (SEE) in particular. Its approach is based on the development of a regional centre of knowledge in SEE education, training and research at Univalle in Cali. Specifically, the project seeks to expand and upgrade its regional postgraduate curriculum; expand Univalle's capacity in regional knowledge transfer and training of professionals; strengthen and expand the research capacity and mentality at Univalle; and utilise the established capacity in SEE and PC at Univalle to support postgraduate training initiatives, research support and provide advisory services to sector organisations and projects in the region⁹.

The expected results are:

Postgraduate programmes

- Conversion of current SEE curriculum into two separate programmes in SEE and EST
- Development of Water Resource Management course
- Development of a regional Centre for the water Sector
- Graduates from MSc and specialisation courses

Short courses, workshops and conferences

- Offering of a minimum of six short courses
- Organisation of workshops and conferences

Research

- 5 PhD graduates of which 3 will receive partial support from the project
- Established routines of conducting research ('critical mass approach') and scientific communication
- Research linkages and co-operative research projects with research groups and sector organisations

South-South co-operation

- Quality reputation in selected areas
- Transfer of 3 short courses to regional universities
- Completion of several projects in the region in SEE

⁸ See Project Document, Op. Cit., p.1.

⁹ Ibid., p.9.

Management of agreement

- Implement the project proposal accordingly
- Continuation of co-operation after ending via joint marketing of training and research activities

In general this means:

- The organisation of the training and research programmes, based on work related to the different academic units included in the agreement.
- The regionalisation of the activities through alliances and the development of projects with institutions from other countries in the region.
- The sustainability of the activities such that IHE and Univalle would be able to continue their support after 2002, based on externally financed activities.

Summary of achievements in figures is given in the next box.

Summary of project achievements

174	Professionals in the sector followed the Specialisation Course, of which 147 graduated.
114	Professionals followed the MSc programme of which 44 graduated.
9	Univalle staff-members with PhD. 5 with grants of the project, of which 3 have finished and
2	more have almost finished PhD.
93	Research proposals presented. 44 have been completed, 36 still in execution. 13 stopped.
6	Staff members trained in master's at IHE.
7	Staff members trained in master's at Univalle.
26	Short courses organised: 4 in 1999; 4 in 2000; 8 in 2001; 5 in 2002; 5 in 2003.
50 - 50	Gender balance between those who were educated in master's and specialisation courses.
17%	Students admitted in master's are from countries of Andean region and the Caribbean.

Planned activities for ESEEl were:

- Convert the current SEE curriculum into two separate programmes in SEE and EST. The new programme in SEE will focus on water quality aspects related to human usage, while the new programme in EST will focus on water as an ecological resource.
- Support development of a third specialisation in Water Resources. Limited support will be given to the development of a third postgraduate programme in Water Resources by the department of Mecanica de Fluidos.
- Develop a regional centre for the water sector. A centre of knowledge on all aspects of water quality and quantity will be created, which is expected to have a regional professional impact.
- Maintain a regional participation of students and guest lecturers. The idea is to continuously promote postgraduate programmes through brochures and other forms of advertisement to attract regional students and the co-operation of guest lecturers from surrounding countries.
- Offer specialised short courses at Univalle and regional institutions. A minimum of six courses will be developed of which three will be in Cali and three will be transferred to the region.
- Organise workshops and conferences with regional and international participation at regular intervals. The bi-annual conference 'AGUA', co-ordinated by Cinara will be organised as a joint Univalle-IHE activity in the years 2000 and 2002.
- Continue regional participation in short courses, workshops and conferences. Effort will be given to promotion of short courses, workshops and conferences regionally through brochures, mailings and other forms of advertisement.
- Develop and implement applied research projects on selected topics via the building of a 'critical mass' in selected multidisciplinary research groups.

- Provide training in research and communication skills ('on the job' and via workshops). This will be achieved through research visits by staff from IHE and other Dutch knowledge institutions and other institutions and researchers from regional and international institutions.
- Establish research linkages with thematically related groups and sector organisations in the region. This will be developed with regional and international universities focusing on similar topics.
- Generate a quality image of expertise available at Univalle in selected areas. Strong quality control for all products of co-operation will be developed, including the postgraduate programmes, thesis research, short courses, workshops and conferences.
- Support the transfer of specialised short courses to regional training centres upon request by regional partners. Course topics will be largely demand-driven and subject to availability of expertise at Univalle, IHE and other knowledge institutions on the basis of co-financing.
- Provide advice and support in the area of education and training in the field of Sanitary and Environmental Engineering to regional training centres upon request. This will include advice in curriculum development, course implementation, and research planning, among others.
- Develop an acquisition strategy. Project opportunities will be continuously screened, and proposals developed in order to be able to effectively provide advisory services and applied research support to SEE projects in the region.

In general, through these activities the ESEE programme has developed a broad scope, considering water supply and sanitation engineering within the wider institutional, social/communal, financial, and environmental context. It takes into account the important notion of sustainability of development programmes and introduces the concept of project management. The ESEE programme is region specific and relates to national and regional requirements and priorities in the sector.

- Changes and adjustments -

The co-operation with and involvement of IHS has not been realised as expected. Activities originally planned for the first half of 2002 have had to be postponed and courses have not been materialised. This was mainly due to limited capacity and change of focus in IHS¹⁰. The bi-annual Latin America water event, AGUA, was postponed for one year so as to avoid its collision with the bi-annual AIDS event. As from 2002, the offer of postgraduate programmes to international students fell. This was due to the change in Colombian legislation, which required that foreign titles be officially approved. The process, which takes at least a year, has had a detrimental effect on applications. Despite these difficulties, the postgraduate programme did continue to attract some international students.

The project was supposed to end in December 2002, but it was extended until the end of June 2004. This is due to the fact that there were funds left over from some of the 'seed money' as well as delays in the execution of some of the activities, such as the curricular reform, the Water conference, and the completion of one of the pending doctorates.

4.1.1 Human resource development

The ESEE project contributed considerably to the development of training and research capacity among the staff of Univalle (both Cinara and EIDENAR). A critical mass of professionals with both MSc and/or PhD has been developed.

¹⁰ *English Summary of 'Progress Report for January to June 2002', August 2002.*

It has strengthened the capacity of sector professionals in Colombia in particular but also in the Andean region and Central America, in preparation and execution of education and research. It has contributed to strengthening of international contacts and collaboration between professionals and institutions in the region and world-wide.

- Strategy to strengthen Univalle's teaching body -

The human resource training strategy implemented by ESEE was based on the university's own policy. It also made the most out of the favourable national context for human resource training, concretely the strategy being implemented by Colciencias. Furthermore, teacher training was key to guarantee the continuity and quality of the postgraduate, as at the start the postgraduate was run by a teaching body close to retirement and 15% foreign lecturers.

During the first phase of the project, ESEE supported the training of lecturers at masters and doctorate level. Its objective was to strengthen the link between research and teaching. The project financed six master's grants for Cinara staff and Univalle lecturers in the IHE and one in ISS in the Netherlands. In this way 7 professionals, none of whom were formerly involved in teaching in the postgraduate programme, studied for the Masters in Sanitary and Environmental Engineering, thus contributing to the institutional development of Univalle and the creation of a critical mass of researchers.

The project also provided some financial support to five doctoral students. The project planned support for 2. Later the budget was re-distributed to cover 4 PhD studies: one full support and 3 partial supports. Of these three lecturers already 3 have received their doctorates and one is about to finish their studies.

At the same time, the project provided a measure of financial support to teachers interested in visiting fellowships, designed to help strengthen the relationship between the academic partners.

The lecturers who have received the training report that they have acquired important capacities and knowledge, such as:

- Stronger research skills; and
- Increased social awareness
- Deeper knowledge of water and sanitation
- New knowledge of areas such as eco-technology.

At the end of the first phase of the project, those lecturers trained abroad with project support or by other means have re-joined the teaching body. Univalle has taken on the task of lecturing in the postgraduate programme fully and successfully in the second phase of the project. This was possible thanks to the projects and the university's teacher training strategy, and despite the fact that since 1998 nine lecturers have retired.

Teacher training was very directly linked to research, as will be seen in greater detail in 4.1.4.

4.1.2 Postgraduate Programmes

The ESEE programme in general has contributed substantially, directly and indirectly to the establishing and strengthening of Post Graduate education in sanitary and environmental engineering (PISA) in Univalle and the wider region. In the following ways:

- Offering annual specialisation courses for Post Graduate trainees of Colombia and the Andean region; In 2004 the tenth promotion started.
- Offering MSc possibilities on relevant research lines for researchers in Colombia and the Region.
- Establishing both the specialisation courses and the MSc programme in Univalle.
- Attracting finance for both from various funding and support agencies, national, regional and international.

- The PISA programme -

The Postgraduate Programme (PISA) is a highly successful and is considered very prestigious in Colombia. The programme has produced 10 generations of graduates, at diploma (specialisation) and master's level. The specialisation offers integral training covering a wide range of topics, while the master's has a clear research focus. So far 147 students graduated in the specialisation from the 174 admitted. The master's students are selected from those who have completed the specialisation. Of the 114 so far admitted, 44 have graduated, and 57 are still doing course work.

Most of the students come from the Colombian Pacific region and only 8.7% have been international. In the case of the masters the percentage of internationals is higher, at 17%.

Attracting students from the Andean region and the Caribbean was considered a priority in the regional strategy. It was not possible to sustain this strategy over time for the following reasons:

- Policy changes in relation to the recognition of foreign university qualifications, which, as has been mentioned, has made it more difficult for foreign students in the region to access Colombian postgraduate education, especially in the case of the specialisation programme;
- The difficulties to sustain over time an organisation for the administration of international students. There is a need to increase the management capacity of the PISA programme in this field;
- Lack of resources for grants;
- Increased demand from Colombia.

Despite these difficulties the mission notes that the number of international students in the master's programme has been of importance. The strategy to make allies of the foreign graduates has been quite successful. Through them it has been possible to organise a number of regional courses, and in some cases consultancies.

Administrative issues in international education

According to the former director of Cinara: 'During implementation learning continued, for example our countries are not prepared to understand what is involved in having international students: to administer international students, so that they receive their money in dollars, that the issue of visas is arranged for the students, those kinds of things. It required a lot of work because the solutions were not written, and the co-operation could not solve this. We found solutions on the road. It implied also learning's far outside the university context, for example in matters that have to do with immigration- and financial policies. The experience and capacity, which Cinara gained in the administration of international projects, was important. This capacity gave a foundation that probably now is not so necessary anymore but at that time was crucial.'

- Grants funding -

In all the years that the postgraduate programme has functioned, a total of 50 Masters grants have been awarded through the project. In addition, funding from other sources was found to finance another 17 grants.

In the case of the Specialisation more than 75% of the students are self-financing. The project has provided funds for only 12% of the grants for the specialisation programme.

The mission wishes to highlight that by using the principle of 'seed money' the management of resources for training of the masters has been more cost effective, as can be seen in the following diagram.

Table 1: Source of funding for the master's programme

Source	1 PROMotion	2 PROM	3 PROM	4 PROM	5 PROM	6 PROM	7 PROM	8 PROM	9 PROM	10 PROM	11 PROM	TOTAL
Univalle – IHE	1	1	3	1	3	4	7	6	18	5	1	50
Self-financing	1	2	2	2	1	2	3		2	5	27	47
Local institutions	7	2	2	1								12
Foreign institutions		1										1
Postgraduate grants										2		2
Univalle-Nacional University									1			1
Cidesco-Univalle-Cauca University											1	1
Total number of students admitted :	9	6	7	4	4	6	10	6	21	12	29	114

- Organisation of the PISA programme -

The Specialisation and Master's programmes in Sanitary and Environmental Engineering are academic programmes of the Faculty of Engineering, attached to EIDENAR. It is EIDENAR and Cinara who provide the teaching and research support for this postgraduate programme. For some of the specific subjects, outside or foreign lecturers are invited, making it possible to know experiences from other contexts.

As a result of organisational reform in the Faculty of Engineering in 2000, EIDENAR has been established. The Director of this School is the current PISA Director and as such has spending authority over the programme. The Co-ordinator of PISA, for his part, is an EIDENAR lecturer in charge of the programme organisation and development including academic planning and logistics. The Rector of the University appoints the Co-ordinator for a period of two (2) years. In the first 8 years of the ESEE programme, the administration of the programme was Cinara's responsibility.

The Planning Committee is an advisory and consultative body for the Programme and is made up of the Academic Co-ordinator, who presides over it, two acting lecturers, one from Cinara and the other from EIDENAR, and a student representative. The Committee includes a secretary and two auxiliaries (monitors) who provide logistical support (systems, processes, audiovisual support, control of students and graduates, graduate data base and programme promotion).

- Alumni relations -

Relations with alumni are still weak. There have been some activities to overcome this problem:

- Updating of information and re-establishment of contacts through the creation of an alumni data base/directory.
- Development of statistics on alumni to help improve follow up their activities and career development.

- Promotional activities for participation of alumni in special events, such as 'Water 2003' in Cartagena, for which alumni got a discount and invitation to a lunch together with IHE graduates from Holland to share their experience.
- Invitation of alumni to attend the 10th anniversary of the Postgraduate Programme in September 2003, as well as a ceremony in September 2004 for a price award to the Director of the UNESCO-IHE, Richard Meganck. In both ceremonies alumni attended *en masse*.
- Through a survey of graduates done at the end of last year, it was discovered that the communication channels between the programme and the alumni are not effective. An electronic bulletin is being prepared to inform graduates of programme events.

- Conversion of the SEE into two separate programmes -

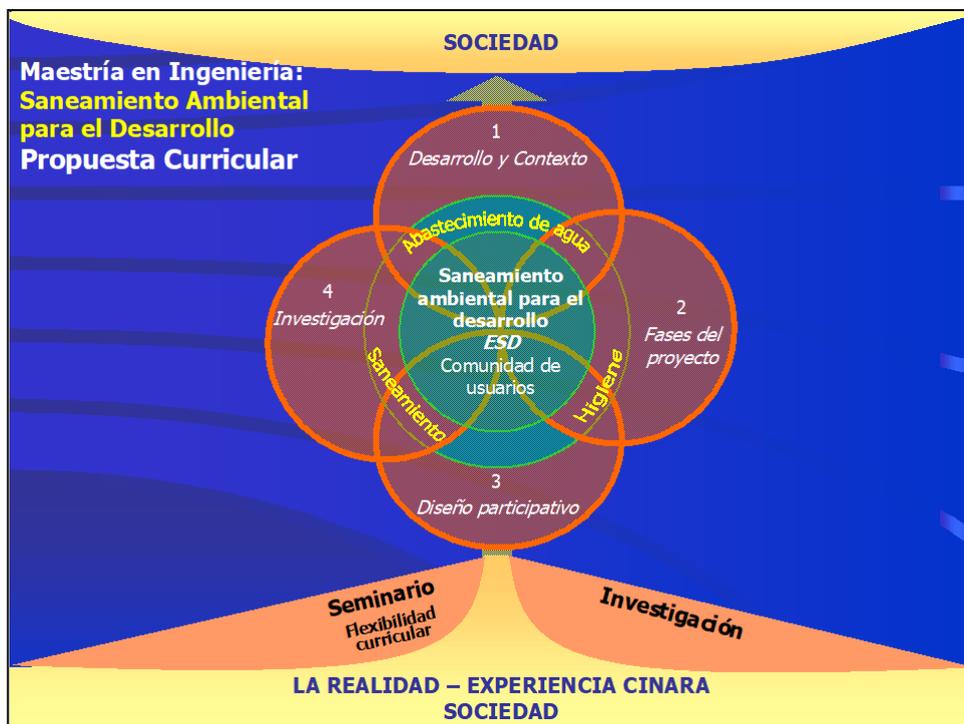
The Postgraduate programme in Sanitary and Environmental Engineering (SEE) emerged in the project and committed three different academic units, Department of Chemical and Physiological Processes, Department of Mecanica de Fluidos and Cinara. The final evaluation of the first phase of the project revealed, that the postgraduate curriculum was overburdened with too many credits. For the second phase it was suggested that the ESEE project should support the creation of two separate postgraduate programmes to make the most out of the strengths of the different academic units. The project facilitated a visit to the Netherlands of the co-ordinators of the three core programme areas. The visit allowed the co-ordinators to learn from the experience of other postgraduate programmes. At the same time a workshop was conducted in which they took important decisions on the focus of each programme.

This process should have culminated at the end of 2000 in order to initiate the two programmes in January 2001. At the moment Univalle is offering one postgraduate programme in Sanitary and Environmental Engineering, which is led by EIDENAR. After the reform a 40 credit programme remains. However, the mission has the impression that the courses now on offer are not as strong as those on offer in the previous curriculum. According to the graduates interviewed, the previous programme guaranteed the integral training of the student, since it included courses that covered also social dimensions. In the current programme such courses have not been included as electives (see Annex 6 curricular programme). The postgraduate programme in water resources is in the process of being approved by the university and suffers from the same problems as the new PISA programme.

Cinara's curricular proposal on environmental sanitation for development is now ready and awaiting approval. This proposal has kept the philosophy of the previous PISA programme (see Figure 1 next page).

The mission considers that the preparation of curricular proposals without a previous consensus on a common philosophy between Academic Units could explain this return to specialisations' lacking an integral vision. The later preparation process has resulted in the loss in two of the three proposals of one of PISA's principal strengths, its integral approach. It is exactly this approach, which is highly valued by graduates. The absence of a common philosophy for all graduate programmes made it possible that every Academic Unit co-ordinating a specific programme has influenced the development of that programme with its own work approach. This has caused loss of the strength acquired earlier.

Figure 1: Cinara's curricular proposal on environmental sanitation for development



4.1.3 Short courses, workshops and conferences

A broad gamma of short courses has been offered in the region (see Annex 6). Also, the International Conference of 'Agua' has become a two-yearly event, which has gained international prestige. 'Agua' conferences were held in 1996, 1998, 2000, 2003 and the next will be held in 2005. Topics were: Improvement of water Quality; Water and Sustainability; Water and Sanitation in small and medium size communities; Multiple uses of water: for Life and for sustainable Development.

The short courses were offered in Colombia and in the region, providing support for teachers of the postgraduate programme, including exchange visits, research, the production of didactic materials, closer links between the University and the productive sector (like with the courses on cleaner production) as well with social organisations linked to the water and sanitation sector. Existing institutional connections were strengthened, and new ones made, at a regional level. Courses were facilitated in Ecuador, Colombia, Guatemala, Nicaragua, Peru and Bolivia. The highest attendance was in Ecuador and Bolivia because of the quality of the contact there with master's graduates.

The mission wishes to highlight that in the second phase of the project, the emphasis of the short courses was on water events. These events have given the University an international profile, in particular Cinara and Eidenar on the theme of water. Such events have a great potential for the future because their organisation does not depend directly on the project. The project's support with 'seed money' allowed other funds to be raised.

Moreover, such events were a point of confluence of experts in the area. For example, the 1998 'Aqua' Conference brought together 5 of the international thesis directors for the doctoral students. Expert advice was also provided for the development of new proposals as part of the move towards strategic alliances.

4.1.4 Research

A very important part of the ESEE project was the support given to research activities. This was one of the priorities established by the IHE experts who provided advice both for the master's programme and the doctorate. From 1992 to the present 93 research proposals have been presented on topics related to Supply of Drinking Water, Sewage Treatment, Solid Waste Treatment, Gas Emissions Treatment, Institutional Development, Hydrology and Ecotechnology. Of the 93 proposals 44 have been completed, 36 are still in execution and 13 were stopped because the students involved had to end their studies before time. These numbers do not include the students who began in January 2004 (21 in total) since they have not yet presented their research proposal profiles.

- Theses under way and completed -

In Annex 5 detailed information can be found on the theses under way and completed during the life of the Postgraduate programme, as well as the theses for the period 1999 –2003.

As was referred to, during the existence of the postgraduate programme (1992 – 2004), the Univalle – IHE Project provided support to 50 masters students, equivalent to almost 44% of the total number of students. Most of the support was provided in the last phase of the project period 1999 – 2003, during which period 38 students received financial support.

One of the weaknesses in this aspect is that financial support did not guarantee that the students would finish their Master's studies. On the contrary, many paid their fees and then left the programme. Of the 38 students who received support between 1999 and 2003, nine (9) cancelled their studies, seventeen (17) are still taking courses and only 12 satisfactorily finished the Masters.

Another aspect worth emphasising is the duration of the research projects. Over 50% of these projects have now ended, which presents a high number for postgraduate programmes in both Colombia and the region.

Yet this average should have been higher given that a large group of students were on grants of the ESEEl programme. In this aspect the mission considers that the resources of the programme and of the research teams have not been put to optimal use.

On average the theses take two years or more to complete, with the exception of very few that were completed in a year. The principal weaknesses are the lack of commitment of the students with the programme; the inadequate selection of research topics; the limited time availability of the student to do research; the inadequate selection of the thesis supervisor; and the thinking that it is enough to provide financial support to consolidate adequately a research process. Finally, another weakness has to do with the University's current norms, which establish excessively long periods of time for students to finish their studies.

There have been attempts in the last two years to improve this situation, including meetings with thesis supervisors, with students, as well as seminars on research methodologies to help improve thesis plans. Actually, steps are taken to monitor the advance of the theses, by requiring regular progress reports signed by the thesis supervisor, as well as the presentation of preliminary results to fellow students or other academic partners at the same aforementioned seminars.

According to written consultation, the great majority of the students report that they will finish their theses in the second half of 2004. It is hoped that this helps to improve the indicators, especially for the students of the 9th promotion who were most benefited with grants and are in the programme since 2002.

- The research strategy -

The project included a strategy to contribute to the training of a 'critical mass' for the Postgraduate Programme in Sanitary and Environmental Engineering. The Figure 2 'Critical Mass Pyramid Model' illustrates the relationship between the projects or research needs, and the development of the water and sanitation sector. The research teams identify those needs in consultation with institutions from the environment sector or, more particularly, in the water and sanitation projects on the ground. These teams, backed up by their supervisors or co-operation networks, define the lines of research and the projects to be developed, as well as the strategies to implement them.

Figure 2: Critical Mass Pyramid Model



Lecturers with doctorates lead the research teams. Such a modality has the great advantage of training highly qualified professionals who are identified with and committed to social change. Access to the latest bibliographic material, equipment, software and research inputs is facilitated; Masters and specialisation level students from different academic programmes become involved through the development of their own research projects, which also involve undergraduate students working on their Final Grade Projects. The research areas are strengthened, through the creation of true Knowledge Centres, with clear research objectives, inputs and above all, qualified human resources. The basis for a future structure of national doctoral programmes in the field of Sanitary and Environmental Engineering is now in place. Science and technology are demystified and popularised in harmony with local cultures; a definite contribution is made to improve the quality of life through sanitary and environmental engineering works.

Put Research and Development on the agenda: Experiences from Cinara

The pyramid dates back to the eighties (see Figure 2). The first ideas were rather classic, but it became very difficult to give continuity to these ideas in a university that placed itself outside the development of the country. There was a need to put university inside the development of the country, but that is a very complex problem to solve. It required trust of the university, of the State and of the institutions related with to object of work.

It is a continuous fight to maintain the balance. On the one hand, if a university is able to penetrate the market and is able to respond to development problems, then the tendency of these institutions is to ask the University to respond to short-term development problems. That may cause the University to loose its identity as 'academia'. On the other hand, if the university is too much centred on classic research it loses its capacity to answer to long-term development. To begin to win space of contributing to the development, without losing its character as 'academia' is a permanent effort.

There is no clear paved 'road' in this. It is necessary to continue on the road and be conscious of what happens through permanent discussions. Sometimes if one is in the world of development, one should not lose its role as academia from the perspective of the university. One has to worry about documenting, analysing, synthesising and critically disclosing.

To work on Research and Development making use of the formation processes (pyramid), means working from the most simple, which are the pre-grades, through the graduate degrees (specialisation and masters) to cycles of continuous education, with graduates, the internships. This is only possible making use of a quantity of academic instruments that have to harmonise with the interventions in the world of the development (changes of priorities, changes of contact persons, etc.). Our learning has been in the development of a clear vision about the essence of the institute and in permanently explaining of that vision.

Interview with Dr G. Galvis in Lima, June 2004

The candidates for the Masters in Sanitary and Environmental Engineering can select their Research Project as part of the Projects executed by the Research or Development Lines of the Academic Units which back the Postgraduate programme (EIDENAR or Cinara). In these Units the participants find direction, financial resources, infrastructure, inputs, bibliographic material and, most important of all, a critical mass for the execution of the mentioned Research Projects. The Masters candidate develops his/her Research Project in an academic – scientific – technological surrounding, making the most out of teamwork with national and international advisers, but maintaining responsibility for his/her own project. Such a research strategy makes it possible to train high-level researchers. The time needed to carry out research is significantly reduced.

The principal research teams that back the postgraduate programme are: 'The Study and Control of Environmental Contamination' and 'Advanced Oxidation Processes for Biological and Chemical treatments', both attached to the School of Natural Resource and Environmental Engineering (EIDENAR), as well as Cinara's research teams 'Drinking Water, Environmental Sanitation and Institutional Development' and 'Community Management'. All these groups received recognition in the open competition launched by Colciencias in 2002. It is worth mentioning that in the Faculty of Engineering of the Universidad del Valle 35 groups have been officially registered.

The mission considers that this strategy, conceived in the second phase of the project, has strengthened the research teams and research activity in general. This has been possible thanks to the impetus of the project itself, Univalle's own policies, and a favourable national context. The production of an EIDENAR scientific journal, with an official ISSN number 1692-9918, has also been made possible, and is in great demand among the teaching staff of the University.

4.1.5 Infrastructure, equipment, and library

The Agreement was based on strengthening with some additional resources of already existing support infrastructure in the University. The infrastructure includes the Cinara documentation Unit, the laboratories and technology transfer units.

- Cinara documentation Unit -

The Unit is made up of 3,700 volumes including books, journals, bulletins, undergraduate and postgraduate theses. There is also printed and audiovisual didactic material: videos, photographs, laminates, CD-ROMs and slides. The most relevant information is the so-called 'grey literature' that makes up the institutional memory of Cinara. These are reports of the results of projects implemented by Cinara in the framework of agreements signed with national or international institutions.

The bibliographic material is catalogued and organised in a database, using the programme CD/ISIS for windows 1.3. This programme was designed by UNESCO and run by the REPIDISCA (Pan-American Information Network on Environmental Health).

The ESEE project supported the documentation unit with a fund of approximately \$US 250,000. However, the mission has not been able to verify this amount.

- Physical infrastructure support for the Postgraduate Programme -

The development of the programme was made possible by the physical infrastructure support provided by Univalle, to which the programme also made improvements. The Universidad del Valle has Laboratories; Research and Development Stations; and Team Learning Projects to support experimental work, field visits, as well as research carried out by the students of the Master's Programme.

The Research and Development Stations were conceived as spaces for applied research, as well as for implementation of a strategy of the popularising science and technology. They are definitely spaces in which development problems can be tackled in the area of water treatment for human consumption, sewage and recycling. Creativity and methods are promoted as well as the integration of institutions from the sector as well as user communities. The Team Learning Projects are founded on the following notions:

- Interdisciplinary and inter-institutional work with the communities as the basis of project implementation.
- Dialogue of knowledge's (community, institutional and academic) as the point of departure for learning and knowledge construction.
- Research and Development as processes, which complement and need each other. In the projects the communities can choose between different technological options developed or adapted to suit the conditions of the country.
- Contact with the network of partners. The processes generated in the projects are supported by access to the experience of other institutions doing similar activities in different parts of the world.

In some of the Departments of the Cauca and Valle a number of technological or methodological proposals have been implemented on a large scale. These are known as Team Learning Projects (PAE's). Similar projects have been implemented in 14 regions of Colombia and in countries such as Ecuador, Bolivia, Nicaragua and Mexico.

- Equipment acquired under the IHE-Univalle Agreement -

Through the IHE-Univalle Agreement, the Sanitary and Environmental Engineering Area (AISA) received economic support for the purchase of equipment to do research in Environmental Chemistry, Anaerobic Biotechnology and the Treatment of Sewage Water. Given that the amount received, assigned by knowledge area, did not allow for the purchase of specialist equipment, it was decided that for each area (for example the Environmental Sanitation Section) extra funding should be found to invest in equipment such as an Atomic Absorber and a Chromatographer to determine the presence of heavy metals and pesticides respectively. This equipment should enrich teaching in the postgraduate programme as well as contribute to research projects in an area little explored in the region so far. Furthermore, Cinara purchased equipment related to research in drinking water treatment.

In addition to this equipment, the following were acquired: an Analytic Weighting Machine, a UV-Visible PH measuring Spectrophotometer, an Oxygen meter, a DQO reactor, a Nitrogen Analyser, a muffled oven, and water distillation and deionisation machine.

Fortunately, this equipment has been well maintained throughout with support from PISA, as well some resources from undergraduate thesis and other research projects supported by the Vice-rectorate of Research. The use of the equipment has allowed important research projects to be implemented with them.

4.1.6 South-south co-operation

The final objective of the project was to develop a Regional Centre for postgraduate education. This is why most of the activities had a regional dimension. These included:

- The participation of students from the region in the Postgraduate programme.
- Short courses with allies from the region.
- Activities to promote the project as well as develop strategic alliances, through visits by Dutch experts and Univalle lecturers to the region, web page, bulletins, and exchanges.
- The formulation of proposals and implementation of projects in the framework of the strategic alliance between Univalle and IHE.

- Participants from the Region in the Postgraduate Programme -

The influx of students from the Region to PISA worked very well in the first years, but unfortunately it dropped in the last years. The difficulties, which help to explain this drop include:

- The situation of political violence in Colombia;
- The need to have foreign academic certificates officially recognised, due to the change in government policy (the average time required to do the paperwork is a year);
- The lack of an adequate administrative structure for international students (the experience developed by Cinara was not transferred to Eidenar, which became responsible for the administration of the postgraduate programme after Cinara had administered it for 8 years)¹¹;
- The lack of sufficient resources for grants; and
- The drop in promotion activities of the postgraduate programme in other countries in the region, which was limited because of the reasons aforementioned, as well as the transition brought about by the change in curriculum.

- Short courses -

The facilitation of international short courses with 'seed money' and others running in parallel to those formally budgeted in the Project was another form of south-south co-operation. Training events took place in various Central American and Andean countries, including Guatemala, Nicaragua, Ecuador, Peru, Bolivia and even Colombia (see Annex 6). A large number of professionals from a variety of institutions from different countries in the region took part in these courses. For example, the Refresher Course done in Cali in 2001 included participants from 12 countries in the Region.

The 'Aqua' events were the most important fora. They became spaces for debate between academic partners in the subjects being explored and they gave the University a regional presence.

- Promotion of the Project and of the Strategic Alliance -

The short courses, the international students, international fora in the countries in the region, web page and promotion bulletins, were all important in making known and promoting the Project activities. They were also the spark for the development of proposals and the later implementation of joint projects.

¹¹ The changes in the administration of PISA, when transferring the responsibility from Cinara to Eidenar, has not eased this process.

The Strategic Alliance bulletin was widely disseminated in the different visits and events in which Univalle lecturers took part and was very well received. The mission considers that this particular bulletin is a very good way of presenting the Strategic Alliance, as well as a good example of the level achieved by the Alliance¹².

- Formulation of project proposals -

Various project initiatives were developed in the framework of ESEE II and the Univalle-IHE Strategic Alliance. In some cases, proposals were presented that have a very good possibility of being turned into projects. Examples include: the proposal "Development of high-performance natural systems for sustainable wastewater treatment and resource recovery" presented to the European Union; the project presented to the World Bank Dutch Trust Fund in Washington by Univalle; the proposal to implement a Regional Centre for Water Management in Urban Areas presented to UNESCO; and the proposal on Eco-technologies for the Treatment of Sewage and Recycling in Small and Medium-Sized Municipalities of Colombia.

Another way was through the participation in the formulation of proposals like the WETnet and the Alfa Programme of the European Union. The latter is a network led by Univalle and IHE, related to research and postgraduate training in Sanitary and Environmental Engineering, involving another 10 universities, 5 in Latin America and 5 in Europe. This last proposal was approved in 2003.

In a number of other cases, profiles were put together as a strategy to begin to sell the idea before handing in definitive proposals. Examples of this strategy include the project proposals derived from the profiles handed into the CVC, including themes such as: Technology Selection, Consolidation of Research Stations on Sewage, Solid Waste Integrated Management and Cleaner Production. Also, the Eco-technology project, which is a co-operation between UNESCO-IHE, Univalle, other national universities and water sector institutions (such as CVC, Acuavalle and Codechoco), was first presented as a profile project. The Netherlands embassy has recently invited partners to present a full-fledged proposal (estimated budget: 3 million Euro from Netherlands Embassy and 4 million Euro sector financing).

The projects that were approved in Cali, Colombia are: the 'Second Phase of the Modelling of the Cauca River', financed by CVC; 'Selection of Technologies' presented to the Ministry of Economic Development of Colombia; and the Colciencias project for 'Cleaner Production', under the co-ordination of Cinara and CRPML. All receive advice from UNESCO-IHE.

The mission is aware that the negotiation of Research and Development projects, from the formulation of the idea until it is put into practice, is a slow process. This is why the considerable amount of time in preparing and promoting proposals, and the effectiveness in doing so, is fully appreciated. Let us recall that it took five years for the First co-operation agreement (ESEEI) between Univalle and IHE to be signed.

¹² Since its conception the following Project proposals have been developed and approved as a result of the Strategic Alliance:

- 2 EU-Alfa projects;
- PMC project;
- Eco-technology project.

Metaphor of a vision as a puzzle

Independently of the projects that are developed with a diversity of actors, the university requires to have a clear vision. This building of such a vision is like a puzzle and it can be easily destroyed. There is a tendency, like in thermodynamics, to entropy (state of disorder). Teamwork allows to give it order, if this is neglected it is disordered. To maintain the puzzle together requires much energy. When it was necessary to negotiate with a public or private organisation, it is not the others responsibility to have the puzzle ordained. That is responsibility of the university. Neither it is correct to tell the private company: 'if it do not fit in our vision we don't work with it'. Nobody will finance the whole puzzle; private or public enterprises will usually only buy one a piece of the puzzle in this project.

Another variable in this relationship is that it is very little understood that investing in science and technology can optimise processes. One of the fights that we have had in this process is on marketing Research and Development projects to development actors with little innovation dynamics. Sometimes it is important to sign agreements or contracts where the word research doesn't even appear on any paper. Then accusations might come from outside that we are competing with the private sector. It has been an enormous effort to explain this to all parties. If the word research is mentioned to industry, they will tell that they don't have money for that. They hire the university to optimise the systems of water of the rural area of the valley. If somebody reads the contract it looks like a normal consultancy contract. We have such a contract with the CVC (called PAAR). However, her participatory methodologies are introduced as well as non-conventional technologies, monitoring with community participation. All are learning how to make use of the civic constitution. If the university applies these in an honest way they will gain a lot of experience with methodologies, which can be applied in other cases. The University will also incorporate these learning's in their short courses; new students will be included in new research areas. In short, it will continue with the process.

This is an activity of the university in pro of development of the country. However, in the contract nothing is mentioned which the university would like to see there. If the university wants to impose this in the contract these innovations would not be possible. These changes will take decades. That is why the university has to continue with such marketing of projects, so that the companies of the public and private sector will benefit from the technological innovations. This is still not very well understood by the private company and the public sector. These are mechanisms to put the university in the heart of the development process, marketing research projects which are responding to the necessities of the market and in turn getting the training of researchers, master's, doctors.

- Implementation of projects -

The joint implementation of projects with institutions from the Sector in Colombia and the Region was in some cases very effective. Cases include: the Cauca River Modelling Project Phase II, in Cali, co-ordinated by Eidenar; the project implemented by Cinara with UNICEF in Nicaragua; initiatives such as the WETnet promoted by the Univalle-UNESCO-IHE Strategic Alliance; and the ALFA Programme (Subprogrammes A and B), which will start during the year 2004. All of these are under consolidation and are contributing to institutional networking in the sector in the region.

In other cases, such as the River Guayas Modelling Project in Guayaquil (Ecuador), projects were successfully implemented, but follow up did not work out for various reasons, like the very weak response of the institutions involved in the project in Ecuador.

- Visits to the Region -

There have been visits by Project executive staff and Univalle lecturers to different countries in the Andean Region, some Central American countries and the USA. The purpose of these visits was, in addition to promoting the project, to strengthen academic partnerships, as well as to formulate proposals for joint projects. These visits occurred within the framework of Project activities, such as the short courses or the negotiation of projects.

- Exchange visits -

Exchange visits refer to visits by students from the region to Univalle, and in which the Ginebra experimental Research station has been of great use. These add to the experience during ESEEI of visits by students from Cuba and Costa Rica.

4.2 Project and financial management

The project is being executed on the basis of sub-activities (e.g. research projects, short courses, postgraduate programmes, staff training), each with its own specific budget. The total activity package under the project, therefore, is being used in a modular approach, both in terms of funding and execution. A major portion of the funding is from sources other than SAIL. The contribution from SAIL is used in a strategic way, mainly to finance the availability of a 'Pool of Experts' and some limited support to fellowships and regional travel ('seed money'). Financial support at activity level (research projects, regional guest lecturers, fellowships, infrastructure, regional advisory services) is solicited from national, regional and international agencies.

The ESEE has been instrumental in establishing a competent management structure for the postgraduate programmes in UNIVALLE.

4.2.1 Organisation and Management

The current phase of the Project is being implemented on the basis of the contract between UNESCO-IHE and SAIL and the agreement signed by the rectors of Univalle and UNESCO-IHE. SAIL approved the project at the end of 1998, to be implemented in the period January 1999 to December 2002. Each year a Work Plan is formulated, specifying the activities to be implemented in that period. Every six months a Progress Report is delivered to SAIL through UNESCO-IHE. Yearly visits of the Colombian Director of the ESEEII to the Netherlands are used to discuss further with SAIL on issues.

Figure 3 (next page) shows the organisational structure of the Project. The Project Co-ordination Committee is made up of the Director of ESEE II, Univalle, the directors of the Academic Units (or their temporary or permanent delegates) and the Co-ordinator of the Postgraduate Programme in Sanitary and Environmental Engineering. The person responsible for the administration of the Project is invited to Committee meetings. The management of the Programme, under UNESCO-IHE, also participates in the Committee meetings. The IHE Project Director, Dr Huub J. Gijzen, generally partakes in Co-ordination Committee meetings when visiting Colombia. Committee meetings help to define and implement policies and criteria, as well as organise and develop the different Project activities. The meetings act as a bridge between Project directives and the lecturers and other people involved in ESEE II activities, including the students of the Postgraduate Programme in Sanitary and Environmental Engineering.

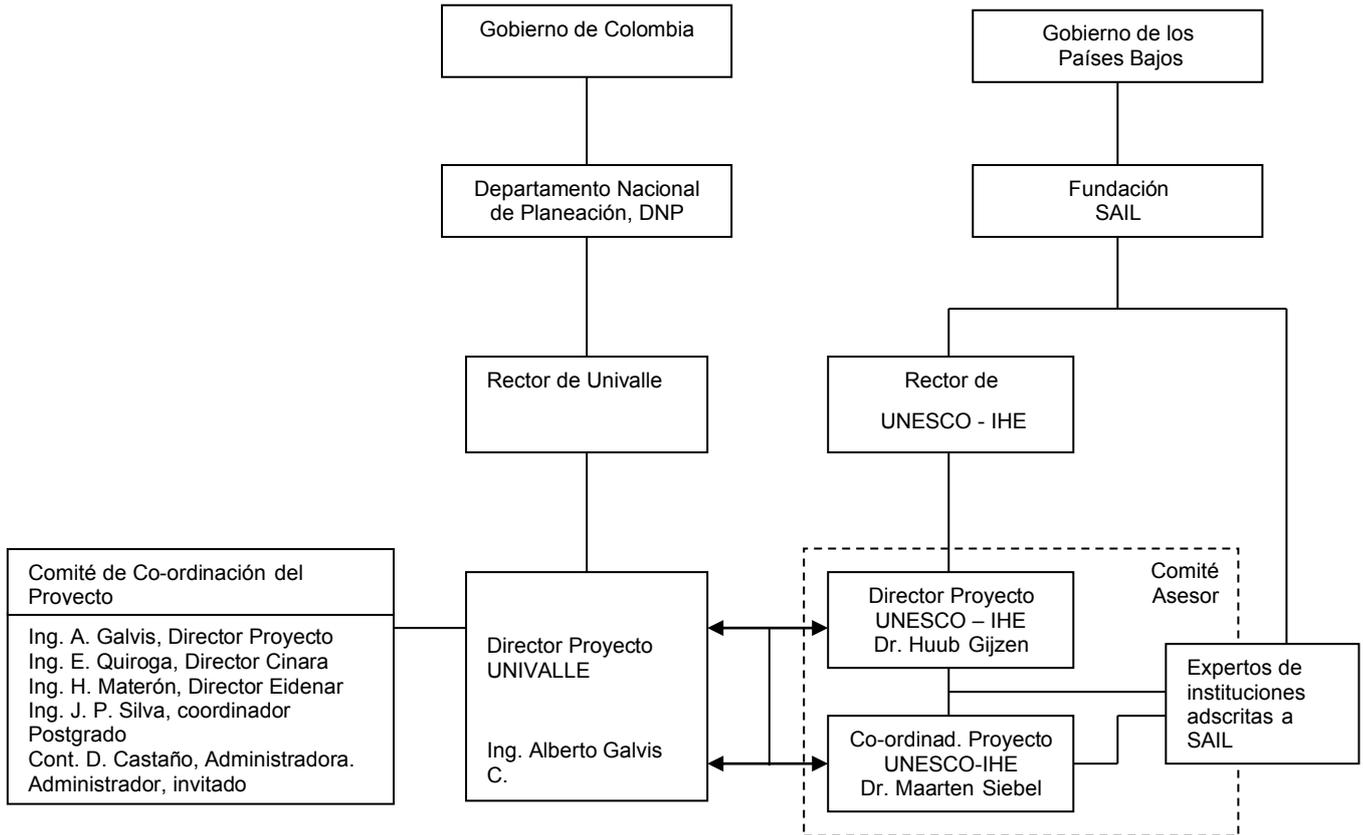
The Committee has been central in decision-making and has functioned since the start of the project. Its purpose is to agree on activities work plan and budget and ensure their implementation. Spending must be approved by the Project Director, with the administrative part responsible for implementation of specific activities.

This organisational structure respects the scope of other academic units such as the Postgraduate Office, which retained the appropriate decision-making powers. For example, the Postgraduate Committee continued to take decisions of an academic kind.

The mission considers that the administrative side of the project's management worked well. The institutional structures, which already existed, were wisely used and respected right from the start. For example, the Cinara Foundation was explored to administer the project, which gave the project a lot of stability. The Foundation did not

depend on the many changes, which took place in the University over the years. At present the postgraduate programme is administered by EIDENAR. However, it is of concern that Cinara, as a Research Centre, is not allowed to administer a postgraduate programme at the moment. The mission is of the opinion that although the Committee guarantees a certain level of functioning, the prohibition on Research Institutes to administer postgraduate programmes could mean that the rich experience accumulated by Cinara in all these years could be lost. This has been put to the attention of the rector of Univalle.

Figure 3. Structure of the Organisation of ESEE II project



4.2.2 Financial transparency

Financial transparency was established since the conception of the project IHE – Univalle. It was based on previously established agreements on budget formulation and its execution. These agreements worked very well in the first phase of the agreement, and they were evolving in time considering the local necessities. Univalle has carried out the execution of the budget of the project in Colombia through Cinara. The budget expenses for the participation of the IHE have been made in Delft.

The execution of the expenses in Univalle has jointly been approved during yearly meetings of the Committee of the Agreement based on a Work plan. It was the responsibility of academic units to execute the assigned activities based on the agreed budgets. These required for their execution the approval of the Director of the respective unit. The mission considers that this form of organising the expenses is very transparent and allowed to strengthen the bonds between the units and committed them to comply with the objectives of the project.

The Agreement was extended in two occasions within the same budget. This allowed the fulfilment of most of the committed activities in ESEE II according to the original project document.

The mission considers that the efficient handling of the resources, by making use of the principles of 'seed money' and 'co-funding', considerably reduced the expenses of the project and facilitated its extension until June 2004. The budget neutral extension has allowed to finish the few pending activities, such as PhD of one of the lecturers, but also to develop an important number of additional activities, all of them in the framework of the objectives of the Agreement.

- From financial support to self-financing of the postgraduate programme -

The Postgraduate Programme in Sanitary and Environmental Engineering has had three major sources of funding: the Common Fund of Univalle; support to the postgraduate programme from the Univalle/IHE/IHS Agreement; and the programme's own resources derived from fees.

The Common Fund, which is financed principally with national central government resources, is mainly to cover the salaries and other payments of lecturers and other employees linked to the Programme. It also contributes to the laboratories and covers some general costs. Such resources depend very much on the institutional stability of the Universidad del Valle and the National Higher Education Policy. The mission considers that sufficient conditions exist for the self-financing of the postgraduate programme.

The Univalle/IHE/IHS Agreement has been an important source of funding for the programme. During the programme's life, the destination of the resources has had different emphases: initially it supported infrastructure improvement and equipment; then, it focussed on the training of lecturers and guest lecturer support; and in the last period it has been oriented more to the financing of grants enabling students to take part in the postgraduate programme.

Table 2 shows a breakdown of the programme's direct resources as well as the investments made in the last five years.

Table 2: PISA Income and Expenditure (1999-2001)

Thousands of current pesos

Budget lines	1999	2000	2001	2002	2003
<i>Income</i>					
* Registration and fees	50.600	58.083	87.006	112.708	95.158
TOTAL INCOME	50.600	58.083	87.006	112.708	95.158
<i>Expenditure</i>					
* Personal services	4.230	5.539	6.613	7.327	6.539
* General costs	16.706	14.605	21.032	32.703	19.669
* Other costs including deanship participation	3.036	3.941	5.605	8.710	14.546
* Investments	-0-	16.429	34.402	30.132	7.138
TOTAL EXPENDITURE	23.972	40.515	67.652	78.872	47.892
BALANCE	27.487	17.568	19.354	29.698	47.266

Source: Faculty of Engineering, Integral Accounting System.

Already in 1999 the PISA had a strong positive balance (some 100 million pesos according to A. Galvis). These numbers show a positive financial balance with constant profits over the period under analysis. Outstanding is the sustained growth in income, reflecting the programme's degree of self-financing.

Equally important has been the amount of funds invested in the years 2000, 2001, and 2002, in particular for the purchase of computer equipment and furniture. Any remaining funds are used to finance a number of aspects considered a priority for the continuous improvement of the programme such as: study and equipment rooms for students; increased internet access for the computer room; technical and project software; computer facilities for lecturers; laboratory material and equipment; bibliographical material for the documentation centre.

From the general financial balance, it can be concluded that this has been highly positive in administrative terms. Nevertheless, the implementation capacity of the funds invested could still be improved, especially in terms of optimising facilities for teachers and students, as well as strengthening the Programme academically.

4.2.3 *Networking and donor co-ordination*

The impetus for the development of institutional networking and co-ordination has been one of the project's principal interventions. This is how it has been possible to implement the programme activities: participation of students from the region in the postgraduate courses; the facilitation of short courses in the region; and the south-south research and co-operation activities. It is through the development of the Univalle – UNESCO-IHE Strategic Alliance that working through institutional networks has grown to ever-higher levels. The ALFA and PoWER projects are good examples. Eco-technology is another example; this is now in a proposal stage and is likely to be approved and to start 1 October this year¹³.

The academic units already had various networks of their own. The project strengthened these networks and developed new ones. 'The networks we already had became integrated. Before, they hadn't worked together, for example IHE and IRC, but now they do. It's the same for the University of Leeds with IHE. We've also contributed to that process¹⁴'. It's also been pointed out that, through the project, networks from the different academic departments have been articulated and the participation of the University in international networks has increased. Those interviewed say that although there has been much improvement, financial limitations remain. 'In our culture we need to see the other person, and that costs money'.

The mission considers that although it is true that this type of work has consolidated the University as a regional centre, it is very important that the University makes an assessment of how much it is getting out of the networks and whether it can play a bigger role in them. This will avoid the problem of wasting energy and/or losing track of objectives.

4.3 *SAIL programme support*

In the first phase the project provided support through the following principal activities:

¹³ This project is a co-operation between 7 institutions (3 universities and 4 sector organisations) and has a total budget value of approximately 7 million Euro.

¹⁴ Interview with Miguel Peña and Ines Restrepo, Cali, June 2004.

- Setting up the programme with IHE teachers and student grants;
- Strengthening the teaching body of Univalle, as well as research, with study grants abroad;
- Short courses for Univalle – Cinara’s regional projection.

In the second phase, the central financing strategy of the SAIL Programme, defined in conjunction with the counterpart, was that co-operation funds would be used as ‘seed money’ to help raise additional funds from other national, regional and inter-institutional agencies. This was a highly successful formula.

SAIL resources covered the following items:

- Postgraduate grants for UNIVALLE teachers;
- Support to PhD students;
- The participation of Dutch experts in research projects, short courses, postgraduate programmes, supervision of research teams, etc.

Univalle committed itself to manage the budget for specific activities through national institutions and international co-operation agencies.

Support from the SAIL programme was mainly provided through inputs of IHE and since 1999 also with IHS, which signed direct contracts with SAIL. There were direct contacts between the Univalle and the SAIL programme. The Director of the Project of Univalle visited the Netherlands once a year to keep among others SAIL informed about the progress of the project. All matters that required the prior approval of the donor were discussed with IHE or IHS directly. During these meetings several times the wish was put forward by the Director of ESEEI of Univalle to have the SAIL representative visit the Project in Colombia. However, this was never materialised. The mission was not able to verify with the IHE if other types of requests or support were asked for and what has been accomplished with regard to these requests.

There were yearly review meetings between IHE, Univalle and SAIL. The meetings took place in the Netherlands to do follow up of the project activities. July 2003 a meeting took place in Nuffic between the Directors of ESEEI (Mr H. Gijzen and Mr A. Galvis) and the Senior Programme Advisor of the SAIL project, Mr H. Maltha. In said meeting information was provided about the request from Univalle to allow for a budget neutral extension of the Project until June 2004. This was approved. The mission appreciates the flexibility of international co-operation in extending the project, something not often seen in other cases. This has allowed applying the ‘seed money’ strategy in an intelligent way.

The project was evaluated twice at the request of SAIL during the first phase. The first evaluation was carried out in 1995 and the second after the consolidation phase in 1998. The conclusions of these evaluations helped to identify the project’s strengths and the shortcomings, and to establish the strategy for the second phase of the project.

4.4 Partnership between Dutch institutions and local organisations

IHE was the engine of Dutch co-operation. Relations, in the words of the Dean of the Faculty of Sanitary Engineering, ‘were cordial, demanding and developed in the framework of a great flexibility. We say this because they understood our level of development as well as the needs of the region. We could define the co-operation as an accompaniment to our experts’.

Most of those interviewed coincided in pointing out that relations with IHE were very good. Nevertheless, in the first phase, especially at the start, there were frictions and problems. According to the IHE Project Director, relations were much more vertical then. Due to the weakness of the local partner, dependency was bigger. In the perception of some of the interviewees, there was a certain 'traditional' bias: 'I teach it and you learn'. However, that had to do with attitudes on both sides. In the process of developing the project, this attitude changed, because the aim was to work towards horizontal relations. This worked out well in subsequent phases.

A former lecturer explained to the mission: 'recognising that we are different and that both need to learn. The project has provided an opportunity to learn about international agencies. The chemistry has been very good. If there were problems, they were cultural. We both had to adapt. We write little, and they look very much for efficiency in terms of the time limits agreed. Things just don't work that way here¹⁵.'

Dr Cadavid, Dean of the Faculty of Engineering, declared: 'It is Univalle that has leadership in the project. This is a relationship of equals and of strategic allies. This has been very important because we haven't depended on co-operation. Cinara and EIDENAR put up their own professionals and technical capacities as counterparts and in this process, we have grown together, even if in the first years it is natural that the weight of international co-operation was greater. Over the years it has diminished'.

Changes from ESEEI to ESEII

Former director of Cinara explains: 'Negotiation of an international co-operation project is a learning process. If one is getting to know better technical co-operation, one starts discovering that there are some rules of the game and that one can negotiate. That happens through dialogue. For example, if one looks back at the evolution of the agreement, we had in the first phase a Dutch resident (TA) to manage the agreement, but in the second phase we sustained, with backing of the university, that we could manage the agreement supported by short visits and that we didn't need a Dutch resident anymore.'

Among the key aspects of this fruitful relationship are:

- Univalle's capacity for negotiation in international co-operation since the start of the project;
- Existing level of trust – Univalle's relationship with Dutch co-operation goes back to the 1970s;
- Framework of great flexibility for programme implementation, taking into due consideration the complexity of the Colombian context.

The evaluation mission has noted the weakness of the participation of IHS. This situation can be interpreted in various ways. Some say that there was sufficient available for their participation, but that there was no 'chemistry'. Others put it down to lack of leadership, and difficulties in involving them in concrete activities due to the context. What a Cinara lecturer reports seems to be the most common concern: 'The co-operation focussed on the units that already existed working towards integration, and the most relevant institutional profile for UNIVALLE was IHE's. This can also be seen in the changes it fomented in the internal structure of the project, from fragmentation to greater integration with EIDENAR'.

¹⁵ Interview with the ex lecturer Viviana Vargas, Cali, June 2004.

4.5 Factors influencing performance

From interviews and discussions with staff involved in the project, the following factors influencing the project performance have been raised:

- The project was supported by an administrative structure which had already functioned for 10 years, was well consolidated by the time the project started, and shared a very similar philosophy to that of IHE.
- Also important was the Project Committee representing different interests and responsible for taking forward the various activities. The Committee created a space for managing conflicts. In the case of ESEE, the Committee and its leaders, the Project Director from the Netherlands, the Director of the Project from Univalle, the Academic Committee of PISA, and the Directors of the Academic Units (Cinara y Eidenar) were key actors.
- Moreover, of great importance were the following:
 - The combination of training and parallel research projects in PISA.
 - Non-hierarchical relationships, built over time with IHE and much in evidence in the second part of the project, greatly contributed to what was achieved.
 - Flexibility in the management of funds, allowing for new ideas to be taken on.
 - The Research Teams took on new projects and thus developed their capacities. In addition, they established important links with other agencies in the sector.
 - Capacity development in managing international higher education programmes, and in making optimum use of strategic resources such as the 'seed funds' offered by the project. This has allowed for the development of synergies at various levels. Such flexibility made co-operation possible.
 - The development of research projects that are formally articulated to education. Such projects have become a receptacle for students' initiatives, offering them a very important platform for their own development.
 - The focus of the programme on regional problems.
 - The capacity to work in teams in a different cultural environment, one in which scientific developments are required to adapt to local geographical and cultural conditions. Both sides learned much in this process.

Add on what already exists

'The graduate programme came at a moment in which we already had gone through different experiences in the University itself. The University was already promoting research and there was already a minimum base of what can be called a 'critical mass' in science and technology. The candidates for a thesis began to have clearing on what to investigate, because the graduate degree student looked for the niches for research and found teams working on topics. These teams were able to incorporate students. That is why we began to have thesis of very good level. Thanks to the fact that those niches were already identified.

The lesson here is that universities that want to develop graduate programmes need to be given time to establish this minimum amount of critical mass and research niches. If this is not possible these universities should affiliate to a network. The three faculty units that participated in the graduate degree programme already had its networks with professors of very good level. The development of the graduate programme allowed these networks to grow further.

Interview with former Director of Cinara, Lima, June 2004

4.6 Conclusions and recommendations to ESEE II project

- In the first phase, the postgraduate programme in Sanitary and Environmental Engineering, with options for specialisation and masters, was successfully established. Activities included teacher training, improvement of the laboratory

infrastructure and updating of the computer facilities. Research was also strengthened, and a number of institutional contacts made and maintained. The development of short international courses was initiated.

- The Consolidation phase was used to make administrative improvements, supervise dissertations, and develop a strategy for conferences and short international courses (the 'Water' series is a good example). The number of elective subjects was increased to improve the masters and specialisation programmes. Various doctoral students were co-financed by the project. The activities led to the building up of a 'critical mass' raising the level of research activities.
- In the ESSE II phase, setting up research and development groups strengthened co-ordination between the academic units. The doctoral training of the lecturers was improved. Emphasis was placed on widening the regional scope of the activities through alliances and project development. Sustainability became a priority, with importance placed on self-financing and the establishment of strategic alliances. Finally, the management and financial systems of the postgraduate programme improved.

- Programme achievements -

Conclusions

- The achievements of the ESEE programme in the 12 years of its existence are notable:
 - Increased supply of professionals specialised in sanitary and environmental engineering in the country and the region;
 - Knowledge development and spread of water and sanitation technologies for rural areas, small municipalities and marginal urban areas;
 - Improvement in the knowledge level and quality of the training offered by the faculty;
 - Improvement of the physical infrastructure, a key feature to raise the quality of research and teaching;
 - Good use made of visiting professors to keep up to date on state of the art research;
 - Establishment of a regular space for debate on the subject of water;
 - Strengthening of capacity of the groups to run postgraduate training, continuous education, and address sector problems via targeted advisory services and applied research.
- In all the phases of the ESEE project a number of key principles were consolidated: 'seed funds', 'critical mass', 'strategic alliances', and research and professionalisation approach which takes as its point of departure basic social needs.
- Some of the experience gained in the three phases of ESEE, specifically that involving interdisciplinary teams focussed on real-world problems, have been scaled up into other activities in the university (for example PAAR).
- There have been important advances to reach the goal to generate a (virtual) centre of excellence based on activities from both Eidenar, Cinara, postgraduates, and all other activities. This is now widely recognised and can be demonstrated by the fact, that Cinara will house the new UNESCO Regional Centre for Urban Water Management.

- Cinara as a research institute already influences national water and sanitation policy for rural communities and peri-urban areas in Colombia.
- Through time, the core of the agreement evolved from *the will to transfer knowledge from the North to the South* to *joint knowledge construction between North and South*. Hence the title of the report: 'From good intentions to a strategic alliance'.
- Eidenar and Cinara have been very productive, academically speaking, with numerous publications, also in English, and in peer review journals. This was not at all the case in 1992. Considering the existing situation of other academic groups in Colombia and the region, important progress has been made during the period of the Agreement. This is also indicated by the recognition of 5 research groups by Colciencias. Nevertheless, Univalle professors feel, that there are still weaknesses in the publication and documentation of experiences.
- The mission considers that improvement is needed in the following areas:
 - The consolidation of the curricular reform for postgraduate programmes.
 - The completion of two more PhD's so that the Cinara research teams can take part in the doctoral programme to be offered by Eidenar. The research teams of Cinara are recognised, but do not have PhD's in their middle.
 - Improving relations with the alumni (ex-students).
 - Improving efficiency in the development of dissertations.
- The Mission realised that there is much uncertainty in Cinara about whether or not the postgraduate programme will be continued, due to the norms established by the university concerning the function of Research Institutes (these cannot administer postgraduate programmes). This would be to the detriment of the experience so far accumulated in postgraduate development as well to the specific contributions the programme has made, and which are of such importance to graduates who participate in PISA.

5. KNOWLEDGE DEVELOPMENT AND SUSTAINABILITY

In this section, we assess whether the project results can be sustained over time. Their sustainability depends on the following factors:

- The quality and quantity of the knowledge and faculties in the Univalle centres involved, in addition to their capacity to expand and renew continuously the knowledge base;
- The national and international stakeholders' recognition of the postgraduate education and research capacities of Cinara and the involved Schools (EIDENAR) of the Faculty of Engineering and the formal authority gained by the Univalle on the subject of sanitary and environmental engineering;
- The job-satisfaction of the staff and their interest in continuing to work for Univalle;
- The financial strength and perspectives of the involved units of Univalle;
- The organisational strength of the involved units of Univalle; and
- The relevance of the knowledge acquired to the sustained development of postgraduate training and research in sanitary and environmental engineering in Colombia.

5.1 Knowledge and capacity

The quality and quantity of the knowledge and faculties in the involved School of Engineering and the Institute of Cinara depends on four aspects:

- Accessibility to new knowledge: their capacity to renew and expand continuously the knowledge base;
- Accessibility for the target groups;
- Social relevance of the acquired knowledge;
- Infrastructure, human resources, organisation and materials.

5.1.1 Knowledge development of the students

The project has had a significant impact in the following dimensions: knowledge and skills development, attitudinal change and awareness raising, resulting from different training strategies: postgraduates, short courses, participation in the implementation of research projects.

a) Knowledge development

In general ex-students say their knowledge of the environmental field has expanded. They have a more integral vision (sustainability). Others say that it is their knowledge of more specific subjects, which has deepened (ecotechnology, sanitation, air quality). Those who are at the same time lecturers on the postgraduate programme continue their training through teaching or by participating in research teams. They still stay in close contact with Dutch experts and other research networks, keeping up to date on a permanent basis. Most importantly, what they have learned they have applied in research appropriate to the reality of the region. Some point out as limitations of the postgraduate course that subjects such as solid waste and air quality were not developed in sufficient depth.

This would appear to have been a conscious choice on the part of the programme, in order to place greater emphasis on the theme of water as a resource. In the future, water as an option will be made more explicit in selecting new students, so that they may choose the specialisation in the full knowledge that it is the programme's star option.

The group of ex-students interviewed by the mission in another university near Cali, the National University, told us: 'The programme has incited us to continue with our training, that is to say to continue with the doctorate. Moreover, there is now a favourable context in the university, and we are applying what we have learned. The action plans we have developed at degree or specialisation level go very much hand in hand with the training we received at Univalle. We are very grateful to have received such training'.

b) Skills development

Those interviewed coincide in saying they have developed a wide range of skills, including reading, writing and computer skills, lab work, gathering field information, and analytical and writing up capacity. They are now more scientifically rigorous in doing their own research. They are also better at communicating their ideas – that is to say expressing their ideas in public – for teaching – applying new methodologies and teaching techniques. In addition, they have learned to co-ordinate groups, plan, resolve conflicts, develop leadership capacities, work in multidisciplinary teams and with the community, as well as formulating and negotiating projects. In a word, they say 'we have learned to plan ahead'.

Worthy of emphasis are the significant advances in developing capacities in the use of research methodologies. The teachers interviewed agree out that the students have learned to define with much greater precision their research topics and this has much to do with the teachers' own capacity development. 'We are happy as teachers: we learned and were able to teach'.

c) Attitudinal change

The students who took part in the different training activities of the projects say they have acquired the following: an open attitude to teamwork and respect for other disciplines, flexibility, resourcefulness, and creativity – that is to say the faculty to identify new alternatives – as well as a holistic outlook. All these factors have had a great influence on their capacity for critical research. They emphasise attitudinal change with respect to the communities on the receiving end of projects. All those interviewed say that the postgraduate programme has changed them. 'Now what we do is defined by the training we have received. An engineering project must involve consultation with the community from the moment of its design. It could not be any other way.'

d) Increased level of awareness

Ex-students say the training they have received is integral, a view the mission shares. They say they have learned to identify and solve problems taking into account their social dimension, in a framework of dialogue with institutions and communities, in other words through a dialogue of 'knowledge's'.

Looking at the curriculum plan, it can be seen that courses exploring the social uses of technology have been given much weight. Technology in the programme has been conceived as a tool adapted to the needs of its users, the reality of the countries of the region and their sustainable development. This holistic view is also reflected in the study themes of the different research teams.

In every case, these teams include environmental protection, or the use of technology to help fight poverty, as a central axis. The postgraduate programme has as a philosophy that the communities should gain access to technology adequate to their needs, and that the students' research proposals should respond to the priorities of the communities under research.

The mission does not see this same emphasis on awareness raising in the current curriculum of the masters in Sanitary and Environmental Engineering. The current batch of master's students whom the mission interviewed and who have already spent a semester on the course, point out that the approach is included in their course, but in theory, not yet in practice. It would seem that the decision to change the curriculum placing greater emphasis on sanitary engineering could result in a less holistic programme approach unless great care is taken to include the course on 'community participation' as a mandatory part of the curriculum. This great value added of the masters in Sanitary and Environmental Engineering runs the risk of being lost.

5.1.2 Knowledge development of teaching staff

The quality and quantity of the knowledge and skills acquired in the training of teaching staff depends on four factors:

- Access to new knowledge and teachers' capacity to constantly renew and expand their knowledge base.
- Access to their study groups.
- The social relevance of the knowledge acquired.
- Human, physical and organisational resource infrastructure.

The above four points will be looked at in the following section.

At Univalle, there had already been a degree of development in the field of Sanitary Engineering at undergraduate level. Yet the university was not moving ahead in creating new scientific knowledge. The project provided a very great impetus for teacher training and generated very rapid multiplier effects¹⁶.

In its two stages, the Project facilitated knowledge creation in areas previously unexplored such as the environment and its different applications. The teachers received up to date information, expanding their vision and connecting them to new knowledge networks. Such links have enriched their knowledge and allowed them to recreate it in the Colombian context, adapting technologies and methodologies, through teaching and especially through the research teams.

The same ex-students, now teachers at the National University, recognise that this has been a central contribution of the masters. They say that the training has allowed them to become leaders in postgraduate training in the university, where they now work, adapting and renewing what they learned in Univalle. To achieve such an impact on both teachers and students required a well-structured strategy.

The strategy included:

- The training of a group of lecturers with the objective of making them leaders in postgraduate training;
- Centring the axis of the project activities in the development of the Postgraduate Programme and, from there;
- The refashioning and recreation of knowledge with scientific knowledge as a central axis. The research teams' role in this endeavour has been crucial, and has been possible because Univalle has in its strategy to become a research university and create a critical mass of researchers. There is in addition a specific policy to promote research. Finally, all the teachers are employed full-time and hence have more time for research.
- Optimal use of Project resources, making adequate use, for example, of Dutch expertise.

¹⁶ Focus group with ex-students of the masters, Cali, June 2004

- Dissemination and recreation of results in the spaces for scientific exchange facilitated by the short courses in which Dutch experts took part.
- Turning water and sanitation research projects into projects of service to local institutions in the sector and small local communities.

The result was a postgraduate programme with an integral approach that tackled subjects in a holistic way to respond to the social needs of the country and the region. Water, for example, requires an inter-disciplinary approach as well as technology appropriate to the conditions of the region.

Discovering and applying Ecotechnology

Julia Rosa Caicedo tells us: 'I did my master's in environmental science and technology in 1995. This widened my horizons in the environmental field. Later I started the doctorate in water treatment applying the concept of ecotechnology. This is the field of knowledge which uses ecosystems or the force of nature to help us resolve environmental problems and at the same time recycle resources. For example, we say that sewage is waste, but 'waste' is also a very valuable resource that just happens to be in the wrong place. Ecotechnology aims to develop alternative technologies that are low cost and allow the reutilisation of resources. Sewage is seen as a resource and not as waste.

I'm now working on my doctorate in IHE in a 'sandwich' mode. I'm developing my research in the experimental station of Ginebra, in Cali. There I'm researching the use of a plant called 'water lentil' for the treatment of sewage. It is very easy to use and can have multiple applications. The lentil has high protein value, reproduces very quickly and can become a source of forage for cattle or have other uses. This is what is known as creating integrated systems, that is to say closing the circle: biogas (energy), biomass (protein), and effluent (irrigation). In this way a number of sub-products are possible, including irrigation water for the community.

This research has been possible thanks to the project which financed the adaptation of the installations in the experimental station. This allowed us to construct the treatment plant on a full scale. The research has opened up a series of other research possibilities in this field for masters' theses (Sanitary and Environmental Engineering 05, Biology 01, Systems Engineering 01); undergraduate dissertations (09 of different disciplines).

In addition, the existence of a full-scale treatment plant has allowed other students of the UNESCO-IHE masters to do their fieldwork in the Ginebra experimental station. 4 dissertations have taken shape there, 3 in environmental engineering and one in the master's in environmental management). International exchanges have also been facilitated with two doctoral students, one from Africa and one from Asia, both of whom have done research there for 4 months.

The team for this graduate programme has become highly qualified, with continuous improvement from the initial phase right up to the present. This is why it is difficult to distinguish between what has been achieved in each phase. According to an EIDENAR teacher, 'Now all the teachers have a postgraduate, so next on the agenda as a challenge for the organisation is a doctorate with an emphasis on Sanitary and Environmental Engineering'.

An ex-teacher from the Univalle postgraduate programme said the experience was very rich for her and that now another university where she works, the National University, is developing a virtual teaching method in mathematics centred on the student. She began this virtual teaching method in a research team promoted by Cinara at a time when all ideas were welcome and encouraged. This virtual education project took shape bit by bit. She developed it in the National University where she now works and where she tells us it has had excellent results.

She also mentioned that what inspires her for the case studies is her experience of fieldwork in the postgraduate programme at Univalle¹⁷.

¹⁷ Interview with ex teacher Viviana Vargas, Cali, June 2004.

In the case of the doctorates a limitation that remains is the publication of the results in scientific journals. In part this is because the journals are very elitist. Some articles have been published, but this is difficult because of the lack of financial support and contacts. Another difficulty is that the supervisors in sandwich-type doctoral programmes are physically distant. This is overcome to a point by using the internet but remains a problem. The limitation is largely compensated, however, by the type of dynamic generated by the kind of postgraduate research, which articulates research from other masters' programmes. The research process is thus turned into a dynamic of ever-deepening knowledge in its various aspects.

- Accessibility for the target groups -

The Faculty of Sanitary Engineering has the following target groups:

- Institutions and other actors responsible for environmental sanitation.
- The communities whose marginalisation makes it difficult for them to have access to basic services.
- The productive sector, with support in specific technological expertise such that the country's requirements for environmental protection and water management can be heeded.

The main ways in which the Project has strengthened its links with these groups include:

- *Technology transfer* to relevant state institutions. What is done is to motivate and strengthen the actions of the institutions that work in the sector, so that they develop technologies that are appropriate to the conditions of each community. Cinara has developed a whole methodology so that communities have access to water and sanitation services from the design process onwards. That is to say the selection of the technology, as well as the development of appropriate technologies for small communities on the urban periphery and in rural areas. Getting state employees to adopt into alternative technologies is a difficult process. Existing norms were developed for big cities, not marginal areas. The strategy is to get the projects accepted as experimental projects. 'When state employees see it works then they accept it to be replicated', says one of the members of the Institute.
- *Clear focus and vision* of study. Through Cinara the Faculty has direct access to marginalised communities and small municipalities. The Dean of Univalle says that one of the great strengths of the University and Faculty of Engineering, in particular, is precisely this: 'to have an institute whose focus of study is the community'.
- *Information dissemination* in national and international events such as the International 'Aqua' Conferences and through working with institutions of the water and sanitation sector in order to involve state employees as well as community leaders in courses, events and exchanges. The goal of these exchanges is to get participants to interact with each other and get to know new approaches and methodologies. Cinara's philosophy is to grow together with others, as this guarantees change. 'We have the philosophy that if we grow, we need others to grow with us' (Ines Restrepo, Miguel Peña).
- Impetus for *regular publications* in scientific journals to make the technology acceptable in academic circles and viable at country level.
- Promoting *research* that captures community opinions on technology uses. For example, Ricardo Caranton's thesis (undergraduate student) showed that if the community is willing to pay per kilo of protein produced by a lentil water treatment plant, the costs of treatment can be covered.

- Through the *scientific supervision* of the various social actors by the university and other experts. We have as an example the case of Cinara Institute and UNESCO-IHE's commitment to develop an integral management programme of the Cauca River, in 2003.

In the last years this style of work has been replicated to other areas of the University because of demand on the part of public and private institutions. During the interviews there was mention of projects being implemented, such as PAAR, which promotes associations of rural communities for the management of their aqueducts. There is also SANAR for sewage treatment in small rural communities. Both projects are based on agreements between Univalle and CVC. Another example is the Cleaner Production Project developed by Cinara in conjunction with CPML.

- Social relevance of the acquired knowledge -

Professionals have been trained with a profile for teaching, academic research, consultancy and public action. All these graduates share the same vision, namely that the projects should respond to the needs of the communities; involving them from the design stage. In other words, what we have is a technical as well as a social process of training.

As well as being a source of information for students, the knowledge generated has fomented institutional change and been of use to the communities of the region. The 'Aqua' events, for example, became an important event for scientific dissemination and technology transfer on the theme of water in Latin America. The events were supported by the Project as from 1996 onwards. It became an interesting standard for projects of this kind: the need to locate experts in processes of cumulative knowledge generation and in interaction with other efforts at regional level.

On the other hand, ex-graduates say that the programme has given them what they needed and allowed them to grow professionally. Several are now in key political positions. Such an impact has importance for Colombia. In the appraisal made by the 'commission of the wise' at the beginning of the decade of the 1990s, Colombia had the lowest indices of high quality technically and scientifically trained human resources.

Such an impact was possible because Cinara's objectives, from before the start of the Project, were focused on knowledge development to find solutions to the country's water and sanitation problems. They concentrated more specifically on those sectors of society where the majority still has no access to such services. The project produced a 'symbiosis': it increased the supply of services to the region as well as in other fields of knowledge, such as environmental eco technologies. Through experimental and/or pilot projects their viability was assessed. This allowed that sanitation control agencies, which are normally very reluctant to adopt anything out of the ordinary, have been taken up these kinds of technologies.

The ex-graduates mention, that the project allowed for the development of socially relevant course content. Work is done on the real problems of the country and the region, thanks to access in the postgraduate programme to professionals from other countries of the region¹⁸. In addition, most of the courses include a social component. The idea is that the student receives training to help him/her resolve social problems, such as access to basic services in marginalised sectors of the population, using appropriate technologies that help reduce poverty.

¹⁸ As has been mentioned this was possible up to 2001, when new norms came in requiring that foreign academic certificates be officially recognised.

There have been significant technological and methodological developments oriented to marginalised groups who have participated in validating the projects. Moreover, careful attention has been paid to gender both conceptually and methodologically. It is the case for example of the 'low diameter' alternative drainage system, which was designed and built with participation from the local population. It is the only technology, which works for the particular conditions of rocky terrain on steep slopes. After witnessing the success of this system, EMCALI, the institution responsible for control and supervision, has recognised the effectiveness of the technology. At the beginning they were sceptical, but after a while, they got convinced. The short courses, Aqua events and experimental projects are spaces, which facilitate the sharing of experiences and the provision of advice by Dutch experts. They also allow state employees from the water and sanitation sectors to become more open to new technological proposals.

The mission witnesses the same process happening with Eidenar teachers. An example is the doctoral thesis on domestic sewage treatment. This treatment uses integrated and sustainable systems, appropriate for poor communities. The technology is highly relevant in social terms, as it generates employment, provides protein. It is also guaranteeing the conservation of water resources. In the same way, other technologies may be highly technical but also very relevant to decision-makers.

Modelling the Cauca River

The research project to model the Cauca River was financed by CVC, the environmental authority of the Cauca valley. CVC is interested in knowing the situation of the Cauca River and in how to manage the river. Said project is led by Eidenar with participation in its implementation by a team of professionals from Eidenar and Cinara who benefited from IHE technical assistance as well as from the Hydraulics laboratory of Delft Hydraulics.

With this project the University won a National Engineering Prize from the Colombian Society of Engineering in the year 2002. The work consisted of estimating with hydraulic models the response of the river to human intervention and natural effects. In order to do this the river needed to be characterised in its various aspects, its physical and geometric parameters, as well as the quality of its water. The quality of the available information also had to be evaluated in order to carry out a mathematical modelling simulation.

A tool for sustainable decision-making

An instrument such as the river Cauca model can become a useful tool for taking more sustainable decisions. Both the CVC and University staff agree on this. For them, these mathematical techniques must contribute to solve real and practical problems and hence make decisions more effective. The project director points out that it will be possible to project the stress capacity of this ecosystem, identify the most contaminated sections, the types of contaminants, etc. CVC add that they would like to have graphical and didactic information from the project, based on rigorous scientific analysis.

With the information that can be obtained from these models, politicians have a basic tool to help them make more sustainable decisions. The costs and benefits of each of the alternatives selected can now be thoroughly analysed. This is what is happening in the Cauca River. A mathematical model has already been produced and is now being adjusted.

The relevance of the project for Univalle

In 2003 the Project for the Modelling of the Cauca River was approved for a second phase. In its first phase, the project was supported by the Agreement through advice by an IHE expert. There was also support from Ing. E. Fernandez, of the Cinara Institute, who did his master's thesis in IHE in the first phase of the PMC project, and from Ing. Carlos Ramirez, trained by IHE and who became project director in the first phase. The Agreement also co-financed the participation of experts in Hydro informatics from IHE and supported the international course 'Hydro informatics in the Integral Management of Water Resources' in 2003. This course was developed and co-ordinated by Cinara under the umbrella of Aqua 2003 with participation of experts from UNESCO-IHE and Delft Hydraulics. Additionally, in March 2004 during a visit, Iona Popescu of UNESCO – IHE advised on the development of the project PMC.

The project has allowed the university to articulate research with the market. The research team on this theme has become strengthened. The Project has three research sub-teams: 'Modelling water quality', 'Hydrodynamics – Sedimentology – Geomorphology', and 'Indices and Critical Parameters of Water Quality'). The project makes a contribution to sustainable development and at the same time allows Univalle to have additional resources to finance more of this kind of research. At the moment the project has two lecturers with doctorates. Various masters' students working on their theses are also involved in different aspects of the project.

The Dean of the Faculty of Engineering clearly summarises the social relevance of this programme: 'If we could achieve in other areas of engineering what has been achieved with the Postgraduate Programme in Sanitary and Environmental Engineering, we would have a university that responds to the needs of an environmentally and economically sustainable society. This is a part of the proposals we can take to the country and to the region'.

In sum, the Postgraduate Programme in Sanitary and Environmental Engineering and the other activities of the project have been directed to meet the water and sanitation needs of the population with least resources. Emphasis was placed on using technologies appropriate to their reality, and most of all, accepted by the community.

- Infrastructure, human resources, organisation, and materials -

The project has contributed to the creation of an infrastructure of knowledge at various levels: human resources, infrastructure for scientific research and equipment, and the creation of the organisational structure of the programme, based largely on Univalle's own organisational structure.

Human resource quality

In the first phase of the project, the axis was on teacher training so that the university itself could have a leading role in the construction of knowledge. In the second phase the training of human resources with partial grants has been maintained, with an emphasis on doctoral grants for Univalle teachers. The focus on training has already produced its fruits. The human capital trained by the university is what the students, aspiring to a postgraduate title in Sanitary and Environmental Engineering, most greatly value. Both graduates and students, consulted in 'focus groups' say that the teaching quality is very good, and that this is one of the reasons why they chose to take up the programme in the university¹⁹.

Research infrastructure

The research teams have formed a platform, which is useful to the students in the development of their postgraduate theses. The university and the government (Colciencias) have officially recognised the teams. Networks linking the teams to communities and institutions are already in operation, with the support of a number of teachers. A channel exists for the student who wants to develop a particular theme. 'Those working on their theses who come into our community have a particular interest.

¹⁹ See list of participants in the focus group in the annex.

Well on that basis we know where to place them. In other words, we start on the basis of what they want to do and tell them where we think they could develop their project, so that the project also meets our needs, and then we give them the conditions to develop their work²⁰. This strong relationship with the communities and their networks makes it possible for the student to have a space to develop applied research appropriate to a particular reality.

Platform for knowledge exchange

The short courses and events have become a way of renewing and recycling scientific knowledge. In this way expert lecturers and students come closer; the presentation of research results by the research teams is facilitated; as well as regional exchange on particular subjects, etc. This has been an effective contribution of the Project and has positioned Univalle regionally.

Physical infrastructure

In the first phase the project helped develop the physical support infrastructure for teaching and scientific research with 'seed money':

- Laboratory equipment;
- Acquisition of specialised information for the Cinara documentation unit;
- Strengthening of the water and sanitation technology transfer units and of the technology transfer unit of Ginebra in the framework of the implementation of demonstrative research projects.

In general, the strategy was to strengthen what already existed, avoiding duplication and ensuring significant counterpart resources on the part of the University. With resources from the Project the bibliographical collection has increased.

Another important aspect, which has made the project sustainable, is that there has been support for research infrastructure in the technology transfer station of Ginebra, which is administered by Acuavalle. The infrastructure of the station has improved in order to meet the needs of municipalities for full-scale technological applications. The station has become a centre of great importance to those working on their theses in the University, some of whom are from different parts of the world.

The infrastructure underwent gradual development during the development of the project, with counterpart resources provided by the university, and it has been able to maintain itself through a series of self-financing strategies. This is based on the resource autonomy policy of each faculty, which promotes the development of initiatives to obtain and maintain new equipment. For example, the laboratories receive funding from the budget assigned to specific research projects. The Documentation Unit from Cinara is affiliated to the REPISIDCA network, through which it receives and provides specialist information on Sanitary Engineering and Environmental Science. It has also signed an agreement with the IRC that has a programme to strengthen resource centres.

Despite these achievements, the new students consider that improvements to the physical infrastructure of the laboratories are still needed, which just goes to show how demanding the students are of the university. The development of this infrastructure is what has allowed the university to get certification from official institutions in the country. One of the requirements, tells us Rodrigo Galvis, was to have a well-equipped Documentation Centre.

²⁰ Arles Saavedra, leader of the water community enterprise of Montebello

The physical infrastructure was also adapted to research needs. This is the case of the equipment of the fluid mechanics laboratory, brought by the Project in its first phase, which proved to be very useful for teaching. With this example of technological adaptation in mind, another was built for more specifically research ends.

5.2 Recognition and authority

The national and international recognition given by stakeholders in respect of the capacities of the Univalle, EIDENAR and Cinara and the formal status of authority gained in the country and region is another important aspect, which the mission will comment upon.

Internationally, it is worth noting that the institutions participating in the Project have moved from co-operation to a strategic alliance. This new state of affairs is reflected in two facts of symbolic importance. The signing in April 2004 of a 'Memorandum of Agreement' for the Strategic Alliance Univalle – UNESCO-IHE; and the Great Cross given to UNESCO-IHE by Universidad del Valle, the University's highest award, in May of the same year. The strategic alliance is clearly due to the level of co-operation and authority gained in the process by both partners in this endeavour.

The Universidad del Valle enjoys much institutional prestige because of the academic trajectory of the undergraduate course of the Faculty of Sanitary Engineering. The creation of the Postgraduate Programme in Sanitary and Environmental Engineering has made it even more prestigious. In this sense the impact of the Project is very great. It has allowed the Faculty of Engineering and its EIDENAR and CINARA Academic Units to achieve the following:

- Recognition of their research teams by Colciencias. This state body promotes scientific and technological development in the country. In the case of Cinara, three teams have been officially approved: 'Water Supply', 'Environmental Sanitation', and 'Community and Institutional Development'. In the case of EIDENAR, two teams: 'Advanced Processes of Oxidisation for Biological and Chemical Treatment', and 'Pollution Study and Control' have been approved.
- Cinara's recognition at both national and international levels. Cinara has taken part in economic and social policy formulation in Colombia and Bolivia, at the request of these countries' governments. Cinara is also part of the National Water and Sanitation Consultative Council and the Council for National Environmental Certification. An agreement is signed recently with the Bolivian government, which certifies that Cinara and its international allies, IRC and UNESCO-IHE, will help the ministry.
- Recognition for the Faculty of Engineering as a national Academic Research Centre that has received the National Engineering Prize granted by the Colombian Society of Engineers. At the international level, the Faculty is now a Regional Centre recognised in the field of water and sanitation. This can be seen in the services provided in postgraduate academic training, joint scientific congresses, and advisory and consultancy services in policies related to water and sanitation.

5.3 Staff commitment

The satisfaction of the staff in their work and their motivation and interest to continue working for the Faculty and /or Cinara is another important aspect to take into account.

The technical team is highly qualified and has been able to raise its level of professional training without losing its commitment to social justice. The Vice Dean for research tells us that 'there is a strong sense in the university of positive initiative, a high level of commitment', as well as much effort to continuously improve professional standards. All those interviewed agree in pointing out that this is especially the case in the Faculty of Engineering.

The university, moreover, is at the vanguard in the country in terms of professional improvement. 22% of Univalle teachers have doctorates, in sharp contrast with the 1.8% national average.

One explanation for the high levels of satisfaction is that the university places considerable value on human capital development. Lecturers' salaries are not very attractive in Colombia, but they are still the best in the region. However, what is especially valued seems to be the fact that Univalle has a policy to employ its teachers full-time and to support research strongly, allowing up to 50% of time-spend on research. Both aspects are highly appreciated by the teachers. In addition, the incentives policy has an important role in ensuring job satisfaction.

In this context, the contribution made by the Project to human resource training, whether by direct funding or with 'seed money', has brought great satisfaction to the teachers. Even in moments of crisis, such as 1998, the university could always count on support from the Project. Among the reasons for such satisfaction, the mission noted the following possibilities:

- Moving up the teacher scale (which has meant a salary increase);
- Integration into new academic circles, invitation to national and international conferences;
- Nomination to special awards (it is the case of Ines Restrepo, senior researcher of Cinara, nominated for the world water prize);
- Links to Dutch academic partners, which will probably continue after the Project;
- More professional opportunities, for example to participate as advisor in Colciencias research projects (as is the case of Miguel Pena);
- Doing new research in an area of interest. The University gives teachers up to 50% of their time for research;
- Social and professional recognition;
- Thanks to the University for having a transparent policy of incentives for continuous teacher training.

Such commitment to teaching and scientific research is difficult to find in other universities, tells us the President of ACODAL. Postgraduate programmes are nowadays seen as a very lucrative 'business' and not much attention is paid to ensure that the content of such programmes really responds to the needs of the country.

At the moment EIDENAR is facing the challenge of launching a doctoral programme in Sanitary and Environmental Engineering. A team made up of EIDENAR and Cinara has been working on the idea, building on the strengths already acquired. This is proof of the kind of motivation needed to face yet further challenges.

5.4 Financial perspectives

The economic support, which an institution is able to muster, is largely a function of its reputation and prestige in the eyes of its stakeholders. The financial strength and perspectives of continuing the activities and initiatives undertaken in EIDENAR and Cinara will be highlighted in this chapter.

Of course, the mission will mainly focus on project-related aspects of the organisation and activities undertaken towards achieving financial sustainability. It is not within the competence of the mission or our remit to make any comment on the financial perspectives of the Univalle as a whole.

The Faculty of Engineering maintains itself with an average of 43% of its own funds, that is to say generated by the faculty itself. Such funds come from the following sources:

- Consultancy or advisory services to institutions. In general, these institutions are involved in research;
- Laboratory services to the community;
- Research and/or development co-operation projects.

Through the system of experts, co-operation has helped very much to develop the capacity of the university to offer services to public institutions. The university has in this way obtained finance for research projects and specific services to the said institutions. This is the case of the modelling of the Cauca River. This is an ambitious project paid for by CVC and run by one of the largest of the EIDENAR research teams. The role of Dutch experts in this project has been very important and has provided backing for the scientific quality of the products. The University is chosen over private consultancy firms to provide services because of:

- The quality of its work;
- Its more reasonable prices;
- Its scientific and up-to-date training;
- The high potential for work of the students associated with the research projects;
- The scientific back-up of international experts;
- Need for research by state institutions as a point of departure to help with decision-making;
- The type of assignment also is different. It requires a strong element of 'applied research' or 'academic development', combined with application. So the work requires a different attitude and expertise.

These are the reasons presented by a CVC employee to renew its contract with the university. She adds that CVC considers the University a strategic ally. In a context of financial restrictions, CVC lacks sufficient technical staff to do the research.

With the end of the IHE agreement in sight, it is thought that the participation of experts could still continue, by including advisory costs in the projects or by obtaining financial support for particular projects, both of which can be sought at the same time.

The mission's view is that self-financing is a viable option, which should not be adversely affected by the pulling out of co-operation funding. The University has management capacity to negotiate new research projects with national and international institutions; and to offer services – supported by its research teams – not only to the public sector but to the private sector as well.

5.5 Organisational/institutional strengthening

The appropriateness of the organisation's mandate, the quality of its internal management procedures, and its policies and decision-making procedures are another pre-requisite for the sustainability of project results.

- Operational processes consolidated -

Basic administrative capacity at the start of ESEEI was good. During its formulation and implementation use was made of already existing institutional arrangements. In this case the Cinara Foundation administered the project and provided a high degree of stability because it was not dependent on the various changes over the years in the University. For Dr Cadavid, the project administered by Cinara, the most prominent Institute of the University, is 'more than a model, it's a paradigm of how things should be done'. This is very much the case because the project was put in the right place. Cinara administered the Postgraduate Programme for 8 years. It has now been taken up by the EIDENAR.

Concept of Research Institute in crisis?

The University is from its nature complex. At the end of the 80 CINARA became a Centre and then later it became an Institute. The University recognised that the Institute had a task in development without losing its task in the university. This happened in the process of passing from a vision to the action in synergy with all those involved. The result is a collective one.

For an explanation of the apparent setback regarding the position of the graduate programme and of Cinara we have to date back to the crisis the university lived at the end of the nineties. In various occasions others tried to replicate the model of Cinara, without being prepared for this. The model was abused in that period, and we live now the setback as a reaction to this. However, it seems that the University is leaving behind this reaction. What is required now is to consolidate this learning.

Interview with G. Galvis, Lima, June 2004

The Project Committee is the main decision-making body and has operated since the beginning of the project. Its purpose is to achieve consensus on the work plan for the implementation of activities, the formulation of the budget, and its follow-up. The Project Director has spending authority, while the administration component monitors the level of spending in relation to the programmed activities.

This form of organisation respected the decision-making of the other academic departments, for example the School of Postgraduate Studies that retained its traditional decision-making powers. The Postgraduate Committee, for example, continued to take decisions related to academic matters.

The basic structure was strengthened in the process, but the point is that the rules of the game were set from the start, that is to say from phase one. It was a difficult process to bring together the various academic departments, to decide who would manage the resources, who would organise spending, what were spending priorities – all this had to be agreed²¹.

The Dutch Director Huub J. Gijzen did a very good job of positioning the programme in the three years he was based in Cali at the Univalle. He was able to make the project flow, resolving power struggles between academic departments, which normally happen in all universities. He was very able as a leader and consensus-seeker and acted as a mediator. The Project's own strategy also helped. The Postgraduate Programme, as the Project's central activity, helped integrate all the various groups that before had tended to act on their own. 'It was at undergraduate level that the divisions between units were more marked. The postgraduate programme was what brought people together. This is when we really started working as a team, making the difference that we're now seeing at a regional level'²².

²¹ Interview with the Ex-teacher Viviana Vargas.

²² Sanitary Engineers Miguel Pena and Ines Restrepo, teachers at the University, part of the CINARA Institute team. They did their doctorates in England and their research was in part supported by the Project.

Separation of management tasks

'We had separated the management of the agreement from the curricular administration of the graduate programme. The academic units that were united in the execution of the agreement shared as common responsibility the implementation of the graduate programme. Besides they had the freedom to organise their own short courses, which allowed them to feel participant of the project.

To distinguish and separate the co-ordination of the curricular apart from the administration of the international project was important. It allowed the university to work on the academic part and Cinara to manage the international administration of the project.

Interview former director Cinara in Lima, June 2004

In phase two of the Project, co-operation support was much more focused on the research teams who were very successful in marketing their products to Colciencias, with the help and advice of Dutch experts. Experts were invited for the short courses, etc. In the last phase of ESEII, Univalle signed an agreement with UNESCO-IHE to form a strategic alliance of mutual co-operation. The alliance is working at different levels, including academic events, joint research projects, and the strengthening of international networks. This makes the university's objectives sustainable, because the financial resources for prioritised projects are administered jointly, making the most of the strengths of each partner in the alliance.

- Vision and strategy process enhanced: identifying the red thread -

Univalle is pretty clear about what it wants. When it sought out international co-operation, it made contact with IHE because of the experience the Institute had in developing international programmes. This clarity of vision was what also allowed for flexibility in the negotiation process. Gerardo Galvis, former Cinara director, reports that between 86 and 92, 5 projects were formulated. This required a lot of patience and trust on the part of the University to take part in negotiation processes of such slowness²³.

Univalle has learnt that in negotiating international projects, vision is more important than negotiation capacities per se. There is a need to be clear about what one wants from co-operation. If the vision is clear, negotiation is built in into the process. The other counterpart also must have a clear vision about what it means to act as a co-operation partner in training and development programmes and recognise both parts as actors in the process. There are no models because everything depends on the particular context. Reality has to be taken into account and there has to be a lot of flexibility.

The same occurs when the University interacts with other development actors. When Univalle negotiates with a public or private source, it is not the responsibility of the client to be clear about the University's vision, but to be clear about his or her own vision. To 'sort out the puzzle' is the University's responsibility (see also box chapter 4.1.6, page 37). Nor is it necessary for the client, public or private firm, to 'fit' perfectly into the University's vision in order to be able to work with them.

What Univalle has been doing is to obtain finance for some of the pieces of the puzzle with a project, tells us Gerardo Galvis. 'In the case of PRODESAL, for example, they were in the industrial paper market, and we proposed that they enter into the market for rural disinfections, with a small project, and they did it. Now a project is being worked out with them with Colciencias. The objective for the firm is to position a new product in the market.

²³ Interview to Gerardo Galvis, Ex Director of Cinara.

For the university it is how to evaluate in a methodical and systematic way, with the participation of firms who offer services, the plusses and minuses of this product. If this is done scientifically, applying principles of applied science, then the private sector is fulfilling its role and the university too'.

Finally, Gerardo Galvis adds that the vision is dynamic and can be built on, that the risk is always there that it can break into pieces like a puzzle. The tendency, as in the laws of thermodynamics, is towards entropy. The work of the team leaders is to ensure coherence. Without it, the team can break down. Keeping the puzzle together requires energy. The mission considers that Univalle has learnt in these years with co-operation support to maintain its vision of a Research University and to integrate the support of the co-operation in that vision.

In the case of the negotiation of the IHE agreement, Univalle had learnt to delegate this kind of negotiation to Cinara, the Research and Development Institute created a decade earlier. Cinara then sought consensus in the University, the Colombian government, IHE and the Dutch government. They also learnt that in the negotiation process some of the positive aspects of the project could not be kept. At the beginning, it was hoped, for example in the curriculum, that a flexible modular system could be introduced, allowing students to opt for participation in short courses, specialisation or masters. This was not approved, as the Colombian government did not agree to the scheme. But over the years this was corrected, once the context was favourable.

Univalle made the most of the Project because when it arrived, the University already had a clear vision of itself as a research university. The University was already working on a number of research topics. The basis existed for a critical mass in science and technology. Those working on their theses were clear about what to research because students coming into the postgraduate programme were slotted into research niches that already existed. Students found functional research teams that they could join. This is why the theses began to be of a very high level, because the research niches were already there.

But beyond its vision as a research institution, the University also sees itself as contributing to development. The pyramid (described in chapter 4) goes back to the 80s. The first reflections were quite basic, because the challenge then was to link research with development. Otherwise, it is very difficult to make the pyramid sustainable.

The challenge for Cinara as a Research Institute was to turn research into something that would contribute to the development of the country, a very complex problem. They had to win the trust of the university, the State and other related institutions. It is a struggle to maintain a balance. It is very difficult because if the University succeeds in penetrating the development market by responding to community needs, the danger is that it will begin to focus on meeting needs in the short-term rather than keeping its identity as an academic institution. On the other hand, if the university focuses only on basic research, it will lose its capacity to respond to more immediate development needs.

Cinara as a Research and Development Institute lives this tension. Inside the University it is perceived as a development actor and among development actors it is not accepted as such, but as part of academia. The point is that Universities who want to take part in development have to gain their space, contributing to development without losing their academic character. For Cinara keeping the balance is an ongoing struggle. When the mission asked those interviewed how this is achieved, they replied that there is no clear route.

What is important is that the Institute recognises this tension and continues to discuss it, in other words that the Institute is fully aware of what's really going on. In sum, when it's playing a development role, it must not lose sight of its fundamental role, which is to intervene in the world as a university, through documentation, analysis, synthesis, and critical dissemination. Only in this way will development actors respect the university as a development actor.

What Cinara and the University learned is to work on both research and development making use of training resources (pyramid) – from undergraduate, to postgraduate level (specialisation and masters), continuous education, diplomas, exchange visits, and other kinds of academic instruments. All can be used in the Project's interventions to attend social problems, the needs of development actors. Harmony is possible in complexity, with frequent changes in interlocutors, priorities, etc. Clarity of vision is what guarantees that one stays on track. The task of Cinara is to continue explaining that vision.

Previous paragraphs probably over-emphasised the role of Cinara, however, also Eidenar participated in the process.

- Institutional embedding strengthened -

Apart from the vision and strategy process and the operational process, equally important is the institutional embedding.

The University, and more particularly Cinara, has developed the capacity to negotiate and manage projects, as well as gaining an important position in society, in Colombia and the region.

In this process of forging and maintaining legitimacy it has been necessary for the Institute to work in developing three areas:

- Gaining legitimacy from academic partners and colleagues. This is why an important part of its work is in research, where results are debated in scientific congresses with academic partners and colleagues, that is to say with others who have similar work objectives and methodologies. In this way the University has built relationships with colleagues and partners;
- The relationship with development actors because Cinara sees itself as an institute that contributes to development. In Latin America universities normally don't develop such relationships;
- Legitimacy in society, in other words that society values what the Institute does because it is considered useful to help resolve problems facing the country and the region.

After 20 years of work, Cinara is aware of how far it has come. Its role in development as a university is clearer and more transparent. It has been recognised by Colciencias as part of a State policy, which sees the need to invest in research projects that involve both the public and the private sector. Without doubt, Univalle and the Project have helped make these changes happen.

This is reflected in the reality that is lived by Univalle. They have passed from the stage of looking for projects to one in which they are the ones sought after to make alliances and formulate joint proposals, and this is due to the prestige the Institute has earned. We are told that 'without looking they look for us'. 'All the time they call us up to meet project needs in the water and sanitation sectors, not only nationally but also abroad. At the regional level, we have the case of an institution in the United States that works for AID that asked us to take part in a consortium to put together an improvement and

hygiene programme in various countries in Latin America²⁴. Another case is that of the study developed in Nicaragua on the sustainability of water and sanitation systems for 43 projects in rural areas solicited by UNICEF and ASDI/Government of Sweden²⁵.

The University has also known how to establish strategic alliances with public institutions responsible for water and sanitation services. The University has a water treatment plant in Puerto Mallarino for the city of Cali, under the property of EMCALI, and a sewage treatment station in Ginebra under the property of ACUAVALLE. Both stations form part of an intelligent strategy of 'placing ourselves at the heart of the business and public sector worlds in order to produce institutional changes in the way such institutions interact'.

These are important steps forward, but the mission is aware that these processes of institutional change need a lot of time to take root. The University is by its very nature a complex institution. The difficulties on the horizon for Cinara as a process seem to find an explanation in the crisis the university experienced at the end of the nineties.

The interesting development of Cinara, towards the mid 1990s, incited the university to promote research centres and institutes, many of which did not succeed because they did not go through the required process. Many of these gained recognition on paper but do not count. The reaction was then to take authority away from these institutes and come up with regulations to increase control over them. This would seem to be the explanation for the apparent setback of Cinara in terms of its position vis-à-vis the postgraduate school. To try to replicate the Cinara model in other faculties without the same preparation was perhaps bound to fail. The mission considers that what may have happened at that time is that the model was abused and that there was a strong reaction after the failure. The mission, based on interviews with the rector and vice-rector of research, sees now that the University is ready to overcome the reaction. For this to occur it must learn from the experience, without losing sight of what has been achieved.

5.6 Conclusion

- Knowledge development and sustainability -

Conclusions

- Cinara brought with it a significant experience in methodologies to work with the community. Thanks to the postgraduate programme, such knowledge grew and developed. International co-operation was sensitive to this approach, and it became one of the principal strengths of the programme. In this way a symbiosis between technical and social knowledge was produced. In addition to its recognition for high technical and scientific standards, the faculty has also gained a reputation for its holistic vision and use of methodological tools better suited to the social reality of the region.
- The programme activities fomented a series of education and research processes which became rooted in the local and regional reality. This was thanks to the development of an integral educational process, focussed on attending sanitation and environmental problems, principally among marginalised groups in society.

²⁴ Miguel Peña and Ines Restrepo.

²⁵ (Cinara, 2003)

- The mission supports the initiative to ensure high quality control in the postgraduate programmes. This will allow in the future for the official approval of the courses, as well as the possibility for students to complete their studies in the IHE and vice-versa.
- The integral / holistic nature of the training has meant that the students have had to confront their own mental models and paradigms. The need to involve the community from the very design of the projects, so as to make them sustainable over time, was emphasised.
- The 'seed fund' strategy designed for the programme worked very well. The University has developed its capacity to manage resources and has clearly set international co-operation as a target for the development of its mission – to become a 'Research University' focussed on sustainable development.
- The strategy to make the laboratory infrastructure sustainable was effective, as this included investment by international co-operation as well as strong counterpart funding by the university. This allowed for the infrastructure to be well looked after and maintained by the unit, as well as providing incentives for the laboratory services to make improvements with its own resources.
- Cinara has become an institute for academic exchange of regional importance. The institute has developed a technology transfer methodology, which empowers communities, and this strengthens democracy from below. In addition, the Institute has had an influence on water and sanitation policies. This is shown with the following type of indicators:
 - Three research teams are awarded by Colciencias;
 - Work experience with international organisms (World Bank, UNICEF, GWP, GWA, WSSCC, among others);
 - International network: University of Leeds (UK), IRC (The Netherlands), UNESCO-IHE (The Netherlands), WEDC (UK), SANDEC (Switzerland), University of Lausanne (Switzerland);
 - Cinara is part of an international network (GARNET, Gender and Water Alliance, Streams of Knowledge);
 - Research projects and transfer of technology projects in Nicaragua, Mexico, Venezuela, Bolivia, Ecuador, Peru, Pakistan;
 - Impact in policies and development of normatives: in Colombia and Bolivia
 - Participation in decision making bodies, like GWP-SAMTAC, Steering Committee of WSSCC and GWA, National Advisory Council of Water and Sanitation;
 - Projects with international recognition: "The Siren" was selected as one of the best practices in Habitat II; likewise, "Mondomo" was selected as the best project in Alliances to Eradicate Poverty of the World Bank Foundation you Crowns);
 - Cinara developed jointly with UNESCO-IHE, the programmes Alpha, approved in the 2003. In these programmes participate, besides Univalle and UNESCO-IHE , 5 other institutions of Latin America (Mexico, Nicaragua, Peru(2) and Ecuador) and 5 other Institutions of Europe (UK, France, Italy (2) and, Belgium);
 - Cinara has been considered to become the Technical Secretary of a Regional Centre for handling of water in urban areas, which would be attributed to the UNESCO. An official of UNESCO in Paris visited Cinara in December 2003.

- The Univalle – IHE Agreement has given the university enormous strength to generate new knowledge, improve infrastructure, develop a postgraduate programme and make it sustainable, count on a critical mass of professionals, develop projects with international experts, and draw on international academic partners.

Recommendations for Univalle

- So as not to lose the experience gained by Cinara, the mission recommends that the University revise the established norm, which prohibits research institutes from administering postgraduate programmes. A research institute such as Cinara has gained significant research experience and thus has the right kind of profile to make a difference in the training of experienced graduates.
- An important aspect of the agreement has been the development of teamwork and alliances between different internal and external structures. It is important to maintain this working methodology and harmonise differences, as they can have a negative influence on motivation and institutional performance.
- In the postgraduate programme, with three specialisations, it is important to avoid any dispersion of effort and bad communication, building on the individual strengths of each unit as well as a common philosophy. In this way sustainable results over the long term can be achieved and backtracking avoided.
- For the postgraduate programmes a more limited number of specialised subjects is recommended. These can remain as electives, but with a very clear thread to guide the learning process. This guiding thread must be based on the following approach: *integral / holistic knowledge, interdisciplinary, teamwork, work with the community, and applied research.*
- It is recommended that the educational design for the masters be based on ‘action – learning’ which is in better concordance with the philosophy we have found in the postgraduate programme. This is a philosophy in which the point of departure is an appraisal including the students’ own experiences, followed by theorisation (incorporating new theories), practice through experimentation (research) and the formulation of an action plan. In this way the student who defends her thesis can apply what she has learned in her professional field. This implies that research be seen as a space in which to experiment with new models of intervention and thinking based on real needs. This also allows students to use lessons learnt in their work and PISA to develop closer links with its alumni.
- It is recommended that there be more follow-up of those working on their dissertations through monthly seminars for reflection, feedback, and documentation, as well as workshops on ‘writing as discourse and knowledge communication’.
- It is recommended that the selection of the students for the postgraduate programme be more rigorous, especially with regards to motivation and commitment, in order to avoid the specialisation becoming little more than ‘branding’ and ensuring the creation of a core group of professionals committed to working for a more just society.

- It is recommended that the Postgraduate Programme formulate and implement an action plan to follow up on graduates. Such a plan could be developed with the participation of the graduates and the inclusion of all the already existing initiatives.
- Now that there is once again a favourable national context, in which students from the region are accepted, it is important for Univalle to develop its capacity to 'offer' the postgraduate programme making the most of all its strategic strengths. This will require the setting up of a system to attract international students. Cinara is in a good condition to lead such a process.
- It is recommended that Cinara's institutional memory – of its acquired experience – made up now of grey literature, be systematised. One of the doctoral theses could be on this.
- A sustainable postgraduate programme has been established. The challenge now is to institute the doctoral programme and make it sustainable in the five research teams. The doctorate could attract the Master's students as well as meet the already existing demand in the region. Moreover, the doctorate will offer a space for trained lecturers to develop their research initiatives. This will contribute to slowing the brain drain and strengthening research even more.
- Aside from large-scale experimentation by lecturers doing their theses in international co-operation with interested institutions (for example Ginebra), it is recommended that the methodology for small-scale experimentation at the community level also be strengthened, through a participatory technology development approach. This alternative avoids the problem of long feedback loops from obtaining the results of large-scale experimentation to adapting them for application in communities (each context, each place needs its own technology).
- The mission recommends that the international Water conference become a platform for permanent exchange, a 'meeting of Latin American and international knowledge's' in water and sanitation. The possibility of hosting the conference in other countries in the region and signing formal agreements with other universities should be studied. This could strengthen Cinara as a regional institute.

It is recommended that current trends in the Colombian and regional contexts related to water, sanitation and the environment be more thoroughly analysed. This would allow Cinara to have a more strategic influence on the policies of the sector, from its perspective of working at a local – regional level.

6. THE OBJECTIVE HIERARCHY FURTHER REVIEWED

6.1 Relevance in relation to Colombian development policy objectives

Relevance is defined as the direct and potential contribution that the project achievements make or can make to meet the development challenges faced by Colombia. In Chapter 2, we have given a brief overview of some of the major socio-economic issues in relation to poverty alleviation. It deals with the attention that should be given to the problems of basic sanitation and the necessity to 'develop the human capacity' in order to guide the development challenges in Colombia and in the region.

The objective of Colombian- and international politics related to human development of the last decade have been to overcome the levels of poverty allowing to enlarge the covering of water and sanitation to the poorest. Besides, in Colombia an important policy of the State became the 'development of the human talent' to have an impact on poverty and redirect the country to development. Both objectives have been the axis of the ESEE project.

The Agreement has focused with great success on capacity building of professionals in Sanitary and Environmental Engineering and on research providing appropriate technology to overcome the problems of access to water and sanitation for the poorest and approaching environmental problems felt by the communities linked to the use of the water.

It has also contributed to the generation of a critical mass of professionals in the Faculty of Engineering of the University of the Valley in the field of the Sanitary and Environmental Engineering with capacity of contributing with concrete solutions to the problems of water and sanitation and to the environmental problems. The formed research groups have given answer to concrete social problems, which were presented by development institutions. They have been hired, for example, to optimise the systems of water of the rural area of the valley. This action research contract that Univalle has established with the denominated CVC, called PAAR, is introducing participatory methodologies, non-conventional technologies, monitoring with community participation, and education in the use of the constitutional rights on civic water inspectors. The work includes other faculties of the University. This research will not only solve the case under study, but it will also have an impact on others. This is due to the fact that a lot of documentation of the process has been developed which give sustenance to the interventions. The synergy produced by these investigations will be seen in the generation of new fields of applied research. These new learning's have also been incorporated in education, and in new research areas. This way the spiral of applied research and education will continue.

Also, the intervention of the university in the development of the country has put Colombia into a new dynamic. The public and private sector have been enriched with the generated technological innovations. Although these changes will take decades, the public and private sector is a lot more permeable to the innovation. They are also much more open now for contract research by the university. The university has to continue challenging the actors of development, so that they are open for innovation. They will have to 'market their projects'. This way the companies of the public and private sector and the social actors can benefit from the technological innovations in a context, which is yet not very open for such innovations.

Besides, the University will be able to continue placing its research projects responding to the necessities of the market and in turn getting the responsibility for the formation of professionals as researchers, doctors, and masters. Univalle and the project have contributed to this process of technological innovation in Colombia. As the mission has already referred in the previous chapter, the project has contributed so that the research projects include as strategic allies the public and the private sector. Besides, it has introduced new paradigms in the handling of projects to solve environmental problems, which are caused by the productive sector ('cleaner production'). At that level it has been sustained and proposed alternatives to be executed in the whole productive and marketing chain. Both approaches have already been recognised by Colciencias as part of its new politics.

Cinara with the support of the Agreement has been able to have an impact at some national level policies related to supply of water, basic sanitation, and cleaner production. The approaches that it has been able to introduce are, for example, the differentiated treatment of the normatively around water and sanitation. The other one, already referred to, is on the policy of Colciencias for the approval of projects. Cinara also developed tools for technology selection that are being used via the Ministry.

6.2 Relevance in relation to Dutch development policy objectives

In this section, an overall analysis of the ESEE II as a whole is presented, regarding the core objective of Dutch development co-operation: sustainable poverty reduction. The mission wants to highlight that the foundation for the evaluation of the programme against the Dutch development policies can be found in the analysis made in previous chapters.

The ESEE project shows a good correlation with the Netherlands development policy and with the Dutch policy for education in particular. That emphasises the importance to "strengthen the capacity and education systems in developing countries",

As has been referred to in the previous paragraph, the development policy of the Dutch government on capacity building coincides with the Colombian politics on the development of the human talent. The contribution of the project has been commented in the former paragraph already. However, by way of summary, this mission coincides that there is no doubt that the project has contributed considerably to:

- Development of a regional institution for postgraduate training and applied research in various water sector disciplines;
- Training of local university lectures and research staff;
- Training of professionals from sector organisations in Colombia and the region;
- Strengthening of the research capacity and development of multidisciplinary approaches in research and technology development; and
- Stimulation of South – South co-operation in the region.

The project activities have been also in line with the four 'spearhead programmes' on 'Environment', 'Women and development', 'Relief of poverty' and 'Good governance'.

6.2.1 Relevance for poverty reduction

The ESEE II has a positive impact on the sub-sectors of drinking water supply, sanitation and on environmental health in the region, via the development of an improved regional training and applied research capacity in these sectors.

Based on this evaluation the mission is of course not in a position to confirm that the project has diminished poverty in the country and the region. What can be confirmed is its contribution to the development of technologies and concrete self-sustaining and demonstrative projects, both for educational purpose and for real scale development. The ESEE project has helped in the resolution of specific problems of poor rural and peri-urban communities. The communities benefited from these technologies have today access to water and sanitation services, as well as better environmental conditions. In all these cases the participation of the community in the process of selection of technologies, design and administration of the projects has been key. The mission can also confirm that the investments made have been effective. They have responded to the necessities of the communities, which appropriated them.

Also through the teaching and research, the students of the graduate degree, the participants in forums and in short courses promoted in the mark of the project, have taken contact with those referred technical and appropriate methodologies, and in some cases have applied these themselves. This access to knowledge and eventual adoption by the development actors has an enormous multiplier effect.

In summary, the mission concludes, that institutions related to water and sanitation in Colombia and the region, and especially the rural communities have been the beneficiaries of technologies of high effectiveness, of low cost and of sustainable adoption which fits the reality of the countries of the region. They also have now professionals with capacities developed for the application of these technologies. The project has emphasised and developed technologies in the field of drinking water and of residual waters. This has deepened the progress Univalle had already developed in this field. Lastly, community participation has been right from the design stage and the selection of technologies, until execution and maintenance by users of the services.

6.2.2 *Relevance for other priorities of Dutch co-operation*

The project has had direct relationship with the topic of environmental protection, and it has contributed directly to the governance of the country. The project has also strengthened advances Univalle had in relation to gender issues.

- Environmental protection -

In the environmental protection it has contributed with technological developments and appropriate and environmentally sustainable methodologies. These technologies respond to the reality of the country and can have an impact on the raise of labour possibilities, foods and/or on the improvement of the quality of life of rural and peri-urban communities.

The ESEE project has contributed to elevate the environmental conscience of the students and teachers. The type of studies that the different research groups promote, and the levels of environmental technological development reached evidence this. Among these we have: ecotechnological applications, modelling of the river Cauca, and the positive appraisal of residuals, biodiversity protection, plans of environmental classification, energy efficiency and alternative energy. In the case of modelling of the river Cauca, instruments used are related to environmental management and have as objective environmental protection of the river. In the case of the appraisal of residuals, there exists a proposal for 'cleaner production' that tries to give answers to problems with residual waste in the small and medium leather industry. This should produce technological innovations, which should protect the environment and at the same time improve the productivity in the full productive chain of the leather industry.

- Governance -

Strengthening of the access to water and sanitation of communities should at the same time lead to the construction of 'democracy from below'. The rural communities administer their own systems of water treatment and sanitation; they care for the water sources, several theses developed in the graduate degree have contributed to this process.

The applied research developed has been the foundations for policy changes. They are based on viable technological proposals and within reach of rural and peri-urban communities. Others are used as alternatives for information handling and policy decisions, like in the case of the modelling of the river Cauca. The idea is to present in a visual and didactic way scientific information, which is based on a rigorous analysis, within the reach of political authorities. Univalle has been summoned by the government to contribute to the document CONPES, where the experience of technological applications has been incorporated, which were developed in the last years with the support of the Agreement. It has also contributed to maintain basic services and access to water on the national and regional political agenda, as well as the topic of water as a resource of multiple uses and the topic of cleaner production.

Additionally, the project has contributed to the development of alternative mechanisms to solve conflicts; also, to establish strategic alliances between the productive sector, the environmental authority and the university and to take part in the practical changes in the environmental behaviour of the productive sector (see as an example the experience of CRPML).

- Gender and development -

The gender topic has been a transverse part of all developments of the project. Woman's participation has stayed in the same range as in the first phase of the project. It had an important weight on the activities of the project. For example, almost 50% of students for the graduate degree are women.

Gender and development has also been incorporated as a topic in research for the graduate degree. There are several theses, both males and women, which have developed research on the gender topic. They have analysed topics such as the access of the women of marginalised areas to water services. They have also analysed from a gender perspective the application of technologies in poor communities.

The mission can observe that Univalle stayed to the vanguard of the IHE in the social and gender dimensions. Cinara already had an experience and Univalle had already travelled a long way on the gender balance topic. In summary the mission considers that the objectives prioritised by the Dutch co-operation have been treated largely by the project. Nevertheless, the impacts on these dimensions can only be measured on the medium term.

6.2.3 Conclusions on social relevance of international co-operation

- The community, target group for the university's interventions, constitutes an inexhaustible source of knowledge and learning, and obliges the researcher to develop a collaborative attitude.
- The *strategic alliances* established with social actors on the themes chosen creates a dynamic in which the university makes a scientific and technological contribution to practice, while at the same time learning from the contribution of other (non-university) actors. This makes more fluid the relations between university and

society, the delivery of services and hence the financial sustainability of the University.

- Changes in the context can have strong effects on the programme, limiting its development or increasing its potential. A positive example was the push by the Colombian State to develop human talent. A limitation in the context was the requirement in Colombian law as from 2001 that all university titles be officially approved. This put the brakes on the regional impact of the PISA Postgraduate Programme.
- The search for 'win – win' situations in agreements with other institutions has been very fruitful. For example, a sewage treatment plant is now used as a centre for demonstrative research. The strategy, proposed by UNIVALLE, was encouraged, and used by the project, which committed resources to develop research infrastructure in centres such as these.
- In selecting graduates for the postgraduate courses, it is important to consider as part of the criteria the creation of a 'critical mass' in key institutions, such that once trained, the new professionals will enjoy the conditions needed to promote change in their own institutions.
- A project of this kind can be very strategic. For example, attracting students to the postgraduate programme who are in positions of power can have considerable multiplier effects in terms of securing and strengthening external alliances.

An international co-operation proposal of clear social relevance, which responds to the reality of the country and is promoted by the University as part of its mission to provide integrated education services (as is the case of Univalle), avoids the tendency for master's titles to become little more than a marketable brand for individual and social consumption.

7. LESSONS LEARNED AND PERSPECTIVES FOR THE FUTURE

Based on the experience of co-operation between IHE and Univalle we present the following conclusions and lessons learnt for future Dutch co-operation programmes.

7.1 General conclusions

- In the first phase, the postgraduate programme in Sanitary and Environmental Engineering was successfully established. Activities included teacher training, improvement of the laboratory infrastructure and updating of the computer facilities. Furthermore, research and networking were strengthened. The development of short international courses was initiated.
- The Consolidation phase was used to make administrative improvements, supervise dissertations, and develop a strategy for conferences and short international courses. The number of elective subjects for the postgraduate programme was increased. Overall activities led to the building up of a 'critical mass' of professionals.
- In the ESSE II phase, setting up research and development groups strengthened co-ordination between the academic units. The doctoral training of the lecturers was improved. Regional scope of the activities was widened. Sustainability became a priority, with importance placed on self-financing and the establishment of strategic alliances. Finally, the management and financial systems of the postgraduate programme improved.
- Through endured international support and a clear vision and strategy the achievements of the ESEE programme in the 12 years of its existence are notable:
 - Increased number of professionals specialised in sanitary and environmental engineering in the region;
 - Increased development of water and sanitation technologies for rural areas, small municipalities and marginal urban areas and strengthened methodologies to work with the communities suited to the social reality of the region;
 - Improved quality of training offered by the faculty;
 - Improved physical infrastructures, a key feature to raise the quality of research and teaching;
 - Good use made of visiting professors to keep up to date on state of the art research;
 - Establishment of a regular space for debate on the subject of water;
 - Strengthened capacity to run postgraduate training, continuous education, and address sector problems via targeted advisory services and applied research;
 - CINARA has developed a technology transfer methodology, which empowers communities and strengthens democracy from below. It has become a recognised centre of excellence on water and sanitation issues.
- In all the phases of the ESEE project a number of key principles were consolidated: 'seed funds', 'critical mass', 'strategic alliances', and a research and professionalisation approach which takes as its point of departure basic social needs.

Through time, the core of the agreement evolved from *the will to transfer knowledge from the North to the South to joint knowledge construction between North and South*. Hence the title of the report: 'From good intentions to a strategic alliance'.

Other conclusions on international co-operation

- The *strategic alliances* established with social actors on the themes chosen creates a dynamic in which the university makes a scientific and technological contribution to practice, while at the same time learning from the contribution of other (non-university) actors. This makes more fluid the relations between university and society, the delivery of services and hence the financial sustainability of the University.
- The search for 'win – win' situations in agreements with other institutions has been very fruitful.
- The community as target group for the university's interventions, constitutes an inexhaustible source of knowledge and learning, and obliges the researcher to develop a collaborative attitude.
- A project of this kind can be very strategic. For example, attracting students to the postgraduate programme who are in positions of power can have considerable multiplier effects in terms of securing and strengthening external alliances.
- In selecting graduates for the postgraduate courses, it is important to consider as part of the criteria the creation of a 'critical mass' in key institutions, such that once trained, the new professionals will enjoy the conditions needed to promote change in their own institutions.
- Changes in the context can have strong effects on the programme, limiting its development or increasing its potential. A positive example was the push by the Colombian State to develop human talent. A limitation in the context was the requirement in Colombian law that all university titles be officially approved.
- An international co-operation proposal of clear social relevance, which responds to the reality of the country and is promoted by the University as part of its mission to provide integrated education services (as is the case of Univalle), avoids the tendency for master's titles to become little more than a marketable brand for individual and social consumption.

7.2 Lessons learnt in relation to the co-operation strategy

- The example of Univalle shows us the important contribution of the gradual development of Dutch co-operation over various decades and in different areas (Wageningen, IRC and UNESCO – IHE) and its capacity to deliver lasting results. It shows moreover that when international co-operation is capable of strengthening already existing local initiatives its impact is much greater.
- When international co-operation works with strong institutions that 'know what they want' and are effectively led, the results are more visible and sustainable over time. The experience has moreover generated important lessons learnt.
- When international co-operation engages with weak or recently formed institutions it should concentrate its efforts on promoting:
 - Sufficient organisational capacity to sustain the fruits of co-operation over the long term.
 - The development of a shared vision and leadership within the university.

- Enough of a relationship between the university and the region to develop processes that can be sustained over time.
- For North – South co-operation initiatives to become sustainable and develop into a strategic alliance, the following is required:
 - Identification with the mission of the university where the programme is located (in the case of Univalle: a research university for sustainable development).
 - Flexibility to help put into practice the mission in the intervention area.
 - The creation of a ‘critical mass’ of academic partners (north – south / south – south).
 - Support for capacity development in strategic management (in the case of the agreement, this is reflected in the Programme pyramid and ‘seed capital’ strategy)
 - The recognition that the initiative is a means not an end, and that it can help identify and develop other initiatives.
 - Transparency in the management of resources.
 - Getting other strategic partners, in the country and/or internationally, on board.
 - Generating trust through the development of small projects as the basis for negotiating larger projects.
 - The development by the University of a strategy to convert short term projects into longer-term initiatives.
 - Strengthening the links between different groups inside the University through the development of strategic alliances. This produces ‘chemistry’ between lecturers from different units, allowing for changes to become institutionalised over time, and the non-duplication of efforts.
 - Two-way exchange becomes established, to the benefit of local and international students (in the case of Univalle, students from IHE who came to Colombia to do research, and students from Univalle who went to The Netherlands).
- The transformation of a learning agreement for the south into a mutually beneficial partnership alliance makes such co-operation sustainable. In the case of Univalle the process of growth and consolidation of this partnership can clearly be seen. The strategy evolved on the basis of:
 - A shared vision of the goals and objectives to be reached.
 - A shared decision.
 - Financial transparency.
- Financing through so-called ‘seed money’ is a strategy which generates a dynamic of multiplying initiatives, as well as avoiding dependency.
- Dutch institutes tend to come with a well-defined supply of services. The success of ESEE is that in the interaction with Univalle the services on offer were able to adapt to the needs of the local counterpart. Designing the programmes together with the recipients of co-operation can result in a considerable saving of effort.
- SAIL put as a requirement for accepting the programme the participation of at least two Dutch partners, when in practice this is not necessary. It can produce unnecessary tensions and end up being little more than a formal requirement for participation.

7.3 Lessons learnt in institutional strengthening and the quality of Higher Education

- A project such as this can be an important factor in the development of a 'critical mass' of professionals with masters and doctorates, which in turn can generate a dynamic of personal growth and the concomitant strengthening of institutional capacities.
- Institutional change processes in universities are long and complex, with ups and downs. In such a context, the existence of nuclei of innovative research that are autonomous and stable over time can make a significant contribution to the university by challenging its formal academic structure. These nuclei can become 'leavers for change'.
- In complex structures such as universities, the processes generated by vanguard institutes, supported by international co-operation, can be poorly understood and incite normal professional resentment or unexpected resistance. Key to avoiding such problems is to ensure open communication with all academic units as well as involving them in strategic decision-making.
- The postgraduate programmes must see teaching and research as intertwined. For the students, it is important to be involved in real-world research tasks. Moreover, the research projects can become a source of income for the sustainability of the programme and the development of teaching.
- The inclusion of research initiatives on the part of the students, both undergraduate and postgraduate, as part of the work of the research teams on real-world problems, is an opportunity for the student to grow professionally, to learn new methodologies and become part of the 'critical mass'. The University also wins: products useful to society, and important elements for the development of new research projects.
- Working in multidisciplinary teams on real-world problems transcends the compartmentalisation of knowledge towards a more integral and holistic view.
- The magic touch: a university can maintain its laboratory equipment, computers and libraries by including in each new project small resources to cover those costs. Another way is to offer consultancies, laboratory services or extension services.
- It is important to have publications. Much effort and support is needed to achieve this in societies that have an oral culture. This can be done, in the first instance, through joint publications, including parallel workshops on writing and composition. In this way a culture of publishing research results can be promoted, and frustration avoided.
- It is necessary that in the development of research programmes there be sufficient incentives for lecturers to want to dedicate time to research, for example by reducing the teaching load of lecturers by 50%, as in the case of Univalle.
- It is important that the University develop controls and incentives to ensure that those receiving grants and who are part of a research team complete their studies. It is also important that these same students show a commitment to the university in exchange for having been accepted. This can help avoid the brain drain. In

Univalle there is a very clearly stated policy for lecturers to devolve to the university what has been invested in them if they resign before their term is completed.

- It is important to have institutional support from the rector's office to ensure the full development of the co-operation and lasting results. Univalle is a clear example of this.

7.4 Lessons learnt for the SAIL programme

The evaluations of ESEE in its two previous moments (1996 and 1998) have been very much centred on the postgraduate programme. However, the agreement involves more than PISA and for this reason the results do not reflect all the richness offered by the programme as a whole, and its interactions. An integral evaluation looking at the sustainability issues provides another dimension, allowing a fuller understanding of the concept and strategies of the ESEE programme. This was much appreciated by the Project Committee.

Some lessons here from the former director of Cinara are:

- There should be a constant investment in the development of capacities. When there is a seed, this should help to create other capacities.
- There should be good balance between pushing, demanding, and at the same time helping to train and create these capacities.
- There should be openness for common learning and trust to discuss problems openly. Who works in development will be faced with problems, as reality is complex.
- Continuity is required, as well as work in networks and great flexibility, in order to maintain the relationships that have been established. Most programmes were of common agreement with the Dutch institution, but when there was the necessity to maintain contacts with Brazil, Mexico, and England, the Dutch institution was flexible. In order situations, international partners can be very jealous. Supposing in such situations that the partner has many capacities, however after the co-operation has come to an end, one might lose all its networks and be left without anything.
- There should be flexibility to fulfil training in the exterior in other countries than the Netherlands, if this is worthwhile.

7.5 Perspectives for the future

Dutch co-operation should make use of experiences in the future that have cost so much. It should be used as a base, as stronghold to co-operate with other countries of the region. A triangulation would make the process of development and transfer of capacities easier. If other countries of the region could have Dutch co-operation in a network with Univalle, the same co-operation could win years. The Dutch co-operation could support other countries but have an agreement with Univalle as a partner.

At the moment in the countries of the region one can find universities with interesting groups that can be seeds for the development of applied research and of co-operation with the Netherlands. If it would be possible to make use of this experience of the

Netherlands developed in Univalle with a broad model of partnership, this would be very fruitful, and years would be saved.

The triangulation among universities is very important. For example, it would be good to impel international alternatives of international graduate programmes, which could respond to the current social necessities. Such a programme should have the international context as cadre.

The UNDP is evaluating the Millennium Development Goals in all the countries of the region. Without losing the autonomy of the university it could pick up these diagnoses. If it could be achieved that a graduate programme could be executed in several universities of the region, these universities could help each other with the development of modules and curriculum. The CEPIS could support in articulating weaknesses and strengths to offer a programme that responds to the objectives of the development in the water and sanitation sector. Dutch co-operation could help these universities.

In that respect the mission sees the signing of the Strategic Alliance as very positive. Several programmes of co-operation have already started between Univalle and IHE:

- The ALFA programme has secured external funding;
- Both partners will manage joint modules and programmes. At the same hand it is looked for a homologue system, which allows granting joint grades, in which students can enrol in one of the two institutes and finalise in the other.
- An interchange is established for teaching staff and students.
- Modules for distance learning will be developed, as well as e-learning and I-learning. To this end the PoWER Charter was signed.
- In the future it is sought of a virtual University for Water.
- The Alliance should be developed as a support to the region.
- Eco-technologies: a new major project with 7 institutions. It is lead by UNESCO-IHE and Univalle.

The mission supports the creative thinking that has been put into the effort and does not need to give any recommendation here. There is enough experience and power at both sites to also make this effort a successful one. The context in the Univalle, the Colombian region and Latin America is very supportive for such initiatives.

ANNEX 1: TERMS OF REFERENCE

An Evaluation – overarching projects – for lessons to be learned

1. Background

The SAIL Projects Programme (SPP) originates from the Programme for International Education Programme (IOP). The latter dates back to 1992 when it was still managed by the Ministry of Foreign Affairs in The Hague, by DPO/IO currently renamed Directorate for Cultural Co-operation, Education and Research/Education and Developing countries (DCO/OO).

In 1994 – at the request of the Minister for Development Co-operation – the Netherlands institutes for Higher International Education formed the SAIL Foundation, thus paving the way for the transformation of a major part of the IOP into the SAIL Projects Programme.

In 1996 the SAIL Project Bureau (SPB) was established as implementing body of the SAIL Foundation. The IOP budget for 1996 was 16 million NLG, which in 1997 was earmarked as SPP budget and increased to 20 million guilders annually.

In 1998 the SPB became involved in the monitoring and administration of the fellowships programme International Education with an annual budget of 40 million NLG.

Late 90-ies the Netherlands Government (ministries of Finance, Education and Development Co-operation) called for innovations in the field of international education, eventually leading to a major reshuffle in the various programmes for international Education and in the subsequent budgetary provisions. In 2002 three new International Education Programmes were launched related to Institutional Development and Human Resource Development. As a result the SAIL Project Programme in its present form will be terminated by the end of 2004. Hence the need for SAIL Project Bureau will cease.

In view of the new developments and according to plan the SAIL Project Bureau has been integrated in the Netherlands organisation for international co-operation in higher education (Nuffic). Nuffic is designated to be the Inter Meditary Organisation (IMO) in particular to execute and manage both content-wise and financially the three new programmes for International Education:

- (i) *Netherlands programme for institutional strengthening of Post-secondary education and Training capacity (NPT);*
- (ii) *Netherlands Fellowship Programme, academic programme (NFP-AP), fellowships of one or more years for academic degree;*
- (iii) *Netherlands Fellowship Programme, training programme (NFP-TP), fellowships not exceeding one year for short courses and tailor-made training.*

Annually a total budget of € 55.26 million (equivalent to 122 million NLG) will be available of which € 30.8 million (equivalent to 68 million NLG) is earmarked for ID programmes and € 24.5 million (equivalent to 54 million Dutch guilders) for HRD programmes.

2. SAIL Projects Programme and the rationale for its evaluation

The specific objectives of the SPP, as formulated in 1996²⁶, are twofold:

- to contribute to sustainable improvement and strengthening of the overall performance of (counterpart) institutes and organisations in developing countries, involved in Higher Education, in particular in "post-graduate training" and "higher professional education" and related research (*institution building*);
- to contribute to the qualitative and quantitative enhancement of educated professionals (*human resource development*).

²⁶ Financial agreement SPP between SAIL and the Minister for Development Co-operation, November 1996

Under these objectives special attention is to be given to:

- the (direct or indirect) effect of the intervention on poverty alleviation and environmental degradation;
- equal access to (quality) education for both genders, for ethnic minorities and economically under privileged;
- co-operation between the Netherlands institutions;
- donor to donor co-operation.

Under the Netherlands foreign and development policy “human resources” and “knowledge infrastructure” are considered determining factors for the development of a country. The SPP is seen as an instrument to arrive at the sustainable improvement of this knowledge infrastructure. The overarching aim of International Education (IE) programmes is thus defined as contributing *“to expand the human resources capacity and advance its quality in developing countries, based upon the needs of these countries and in compliance with Netherlands policy principles”*²⁷.

The objectives formulated at both the SAIL Programme level and the National Policy level form the framework in which the activities of the SAIL projects take place. As such this forms the context for the integrated evaluation.

- Rationale -

The SPP objectives are in line with those of the erstwhile International Education Programme (IOP). In 1996 the management, administration, and monitoring of those IOP projects, which were executed by the SAIL Institutions, were handed over to the SPP as per “Protocol of Transfer” dated November 16, 1996. Several of these projects were approved as early as 1992.

Thus, the SPP – although only 6 years old- can rely on 10 years of experience in international education interventions. In view of this and given the current developments and policy innovations in International Education it is felt appropriate to identify “lessons learnt” over the SAIL period²⁸, taking into account that some of the projects originate from the IOP. This being the first reason for the integrated evaluation.

The accumulated lessons learnt from the evaluation of a selection of projects will in particular benefit the International Education Institutes, both the Dutch as well as the counterpart organisations. Furthermore, it would benefit the new programmes for ID and HRD (like the NPT, NFP-AP, NFP-TP). And finally, it possibly could be of interest as well to policymakers of the countries involved.

A second reason is vested in the current ongoing projects that require additional funding to either strengthen the sustainability of the “results achieved” or to continue unfinished activities started under the SPP, which are not eligible for funding under the new programmes. This applies in particular to projects, which will not be able to execute a second (follow-up) phase under the present SPP, due to its phasing out. The evaluation results could facilitate obtaining funding from other sources.

3. Evaluation Aim, specific research questions and related objectives

The primary aim of the evaluation is formulated as:

- **to draw forward-looking lessons from past experiences.**

More precisely to identify lessons learnt (and how they were learnt) at project level, from the SAIL projects as executed within the framework of the SAIL Project Programme. The prospective learning areas are briefly described under 5. The accumulated lessons learnt can be formulated for the SAIL Pr. Programme.

A secondary aim is:

²⁷ Beleidsuitgangspunten en criteria voor de uitvoering van het IOP-SAIL, April 18, 1996.

²⁸ The envisaged evaluation will focus solely on the SAIL PP and not on the fellowship programme, as this has been part of the SPB portfolio since 1998 only and exclusively for financial administration and co-ordination.

- **to assess the “state of the art” for selected SPP projects and if appropriate to make recommendations for the future.**

More precisely to assess the opportunities and points for improvement, thus providing justification as to why and how projects could best be continued.

To be able to draw lessons in the broad context of IE policies the achievements of the assistance since 1996 (cq 1992 where applicable) have to be established at the operational project and programme level levels. This leads to the following three research questions:

1. Have the various activities/interventions developed per project contributed to achieving the specific project aims as formulated in proposals and possibly amended in other documents?
more specified:
 - to what extent have the planned inputs to the individual projects been provided
 - to what extent have the planned outputs of the individual projects been achieved
 - to what extent have the activities met the objectives of the projects
 - to what extent will the intended results of the activities be sustainable
2. Have the individual SAIL-projects contributed to achieving the objectives of SPP:
 - a. to enhance the capacity and quality of human resources in developing countries
 - b. to improve and strengthen the overall performance of specific institutions as described above?
 - c. to what extent have the programme framework and the operational mechanisms influenced the implementation and the outcome of the projects.
3. To what extent have the joint SAIL Projects contributed to the aim of the SAIL programme as a whole in relation to the Netherlands International Education policy viz. *the growth of the capacity of human resources and advancement of its quality in developing countries, based upon the needs of these countries and in compliance with Netherlands policy principles?*

- Objectives -

To properly answer the research questions the following evaluation objectives are defined:

At project level: to evaluate ongoing projects in terms of results achieved, whether these were relevant in the context of the overall project aim, its effects and efficiency, sustainability (academic, organisational/institutional, financial) and potential for further development.

At programme level: to assess what results the joint projects brought about and whether this was relevant in the context of the program objectives, and whether it strengthened the institutions and enhanced the capacity and quality of human resource and if so, in an effective and efficient and sustainable manner.

These objectives will be further elaborated at project and programme level in an analytical frame, which will guide the evaluation process (see further under 5).

4. Scope and evaluandum

The scope of the evaluation will encompass the entire “institutional landscape” in which the activities of the individual projects from the SPP are taking place. The prime focus will be on the supported and supporting institutes (partner institutes in developing countries and in the Netherlands) as well as the regional and national context in which the projects were undertaken. Secondly it will include the SAIL programme, its organisational structure and system as a whole. Thirdly selected also relevant actors, systems and determining factors will be included.

The complete SAIL project portfolio dating back to 1996 up to 2002 will form the resource base for the evaluation, including relevant developments of the pre-SAIL period for projects, which originate from the IOP. On basis of a number of criteria (see 6, methodology) a representative selection of projects to be evaluated will be made.

Besides, project files and documents (such as annual reports of SPP, guidelines for SPP project formulation, progress reports, documents of national and international (sector) agencies will be studied.

5. Areas for learning and analytical framework

Human resources capacity building, quality-wise and quantity-wise (based upon the needs of the developing countries and in line with the Netherlands policy) will be the main issue for assessment.

Within this broad field the focus – as this is the SPP mission – will be on the strengthening of such human capacity through building of (empowering) institutes involved especially in post-graduate and higher professional education and related research.

The assessment of the various project interventions may teach interesting lessons in the field of human resources development and institution building. A number of specific learning areas are already distinguished, in addition to yet unknown areas of learning which may emerge in the course of the evaluation. To name a few of these areas:

- The process of need identification and project preparation;
- The finances available;
- The mix of activities developed (such as course development, training, research);
- The management style and administration;
- Nature of partnerships;
- Support rendered;
- Monitoring of progress.

These areas are to be further detailed at both project and programme levels, in key issues, evaluation criteria and indicators. This subsequently requires a system of validation, which would make it possible to aggregate and compare the evaluation results to eventually make a general judgement in terms of relevance, efficiency, effectiveness, and sustainability in the context of the SPP overall aim. The learning areas and key issues are to be further elaborated in an analytical frame that will serve as guide in the evaluation process. A first set up of such frame is attached (Annex 1). The OECD definitions are used for the terms: relevance, efficiency, effectiveness and sustainability.

6. Approach, methodology and organisation

- Approach -

The evaluation is envisaged to take place in a number of phases:

1. Acquiring broad support for the ToR particularly from the IE-institutes in the Netherlands, their partner institutes and the Netherlands donor.
2. Elaboration of a plan of “actions to be taken”, addressing among others, projects selection, analytical framework of the evaluation, evaluation methods, identification of Support Group members, timetable and prospecting national evaluators.
3. Preparing a schedule for Support Group briefings and consequent briefing of the IE-institutes.
4. Identifying/selecting relevant documentation and identifying resource persons including earmarking groups of trainees and employers for interviewing.
5. Desk study of selected policy, evaluation documents and analyses of project files resulting in an update of the analytical frame and key issues to be addressed;
6. Field evaluations by various evaluators (within the analytical frame designed) of approximately 10 representative projects.
7. Compiling data collected, reviewing, analysing.
8. Drawing lessons at programme level with stakeholders possibly in a Regional Meeting.
9. Drafting the reports and presenting and discussing results with peers.

The various phases may overlap in time.

- Methodology -

Through this integrated evaluation valuable lessons to learn will be accumulated. This evaluation is to be done bottom-up, through a widely set-up evaluation of individual projects. Including the analysis of already existing project documents and evaluation reports. Subsequently the data collected will be assessed and supplemented in the context of the SAIL Programme and its overall objectives, which are based upon the donor's policy for International Education.

A number of SAIL projects have already been evaluated, the results of which may be used. Additionally, a maximum of 11 other projects will be evaluated, selected on a number of programme and project features such as:

- the sectors covered by the interventions;
- proportional representation of (Netherlands-based) IE Institutes;
- geographic distribution;
- partnership arrangements between institutions;
- phase of project implementation;
- "learning" potential.

Selected projects are to be analysed using a combination of tools including field visits, interviews with SAIL institutes and other resource persons (e.g. students/alumni) and desk research.

The evaluation will be executed in close co-ordination with, and with participation of, the institutes at stake. Interviews, self-assessment through workshops, focus group discussions and teleconferencing are among the methodologies to be considered.

Participatory methods are advocated considering that self-assessment gives the best learning spin-off.

- Organisational aspects -

A number of functions are discerned in the process of the evaluation.

1. The evaluation itself.
National and foreign evaluators will be selected to execute the evaluation. Each evaluator will be accountable for an independent judgement and for the quality of his/her work. The evaluators will operate in teams, (in variable composition) each of which will cover 2-3 projects.
2. Co-ordination of the evaluation teams (content-wise).
A co-ordinator of the evaluation team will be appointed to streamline the operation, to co-ordinate the different contributions and to enable a smooth evaluation process with the assistance from the SPB.
3. *Logistical Support to Evaluation team.*
This will be provided by SAIL Projects Bureau (1-2 persons will serve as focal point) and the Project Offices of the SAIL Institutes.
4. *Methodological and other support on content matters.*
A Support Group made up of maximum 6 experts will be installed to give support and advice to the evaluation team, where deemed necessary. The group could include representatives from the (independent) SAIL Project Committee, the Ministry of Foreign Affairs and Nuffic/IMO.
5. *Peer assistance.*
For drawing lessons to be learnt by selected representatives of Institutes from the South and North assistance may be provided in the form of a (one-off) workshop, to be organised in the region at the end of the project evaluations.

7. Time Frame

The evaluation process will be spread over a period of approximately 1 – 1½-year, starting the implementation of the evaluation assignment in March 2003, finalising mid 2004. Preparations started in May/June 2002.

A more detailed timeframe will be worked out separately and will be updated regularly.

8. Reporting

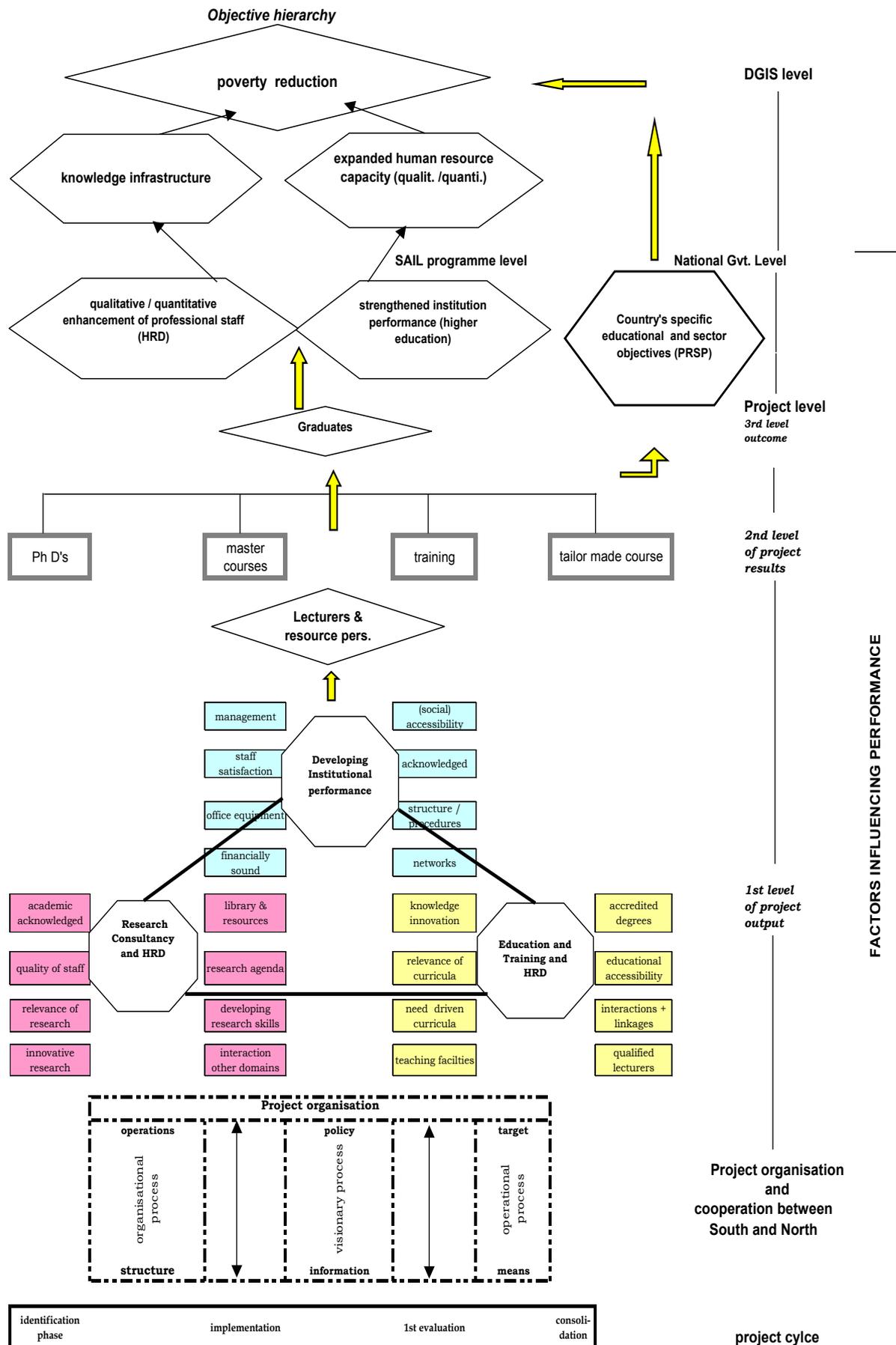
A separate evaluation report will be written for each project evaluation, describing the overall assessment (as outlined in this ToR) and where appropriate highlighting the scope for future development and funding of the project. This report will mainly serve the project responsible institutions and the evaluation team to use as input for the programme and policy assessment.

A final report presenting the end results of this integrated evaluation a comprehensive synthesis report will be written, addressing methodology, factual information gathered from 11 selected projects, conclusions, lessons to be learned and recommendations. This report is meant to serve the Institutes both in the Netherlands and in developing countries, SAIL, the IMO and the donor(s) (e.g. the Netherlands Government).

It is intended to make a so-called public version of the findings, conclusions and recommendations of the evaluation meant to inform a wider public of policy makers, students, alumni, other donors and actors in the field of international education.

The final report as well as the project reports will be written in the English language.

ANNEX 2: ANALYTICAL FRAME



ANNEX 3: ACTIVITIES DURING THE EVALUATION MISSION AND PERSONS MET

SAIL evaluation mission – list of activities

Martes 1° de Junio

- 08:30 – 10:30 Reunión con el Director del Convenio Univalle – IHE (A. Galvis)
- 00:30 – 11:00 Receso
- 11:00 – 12:30 Revisión de documentos
- 12:30 – 02:30 Almuerzo
- 02:30 – 03:30 Reunión con Decano de la Facultad de Ingeniería, Dr Héctor Cadavid
- 03:30 – 05:30 Reunión con el Comité de Co-ordinación del Convenio Univalle – IHE (E. Quiroga; H. Materón; D. Castaño; J. P. Silva; J.L. García; A. Galvis)

Miércoles 2 de Junio

- 09:00 – 12:00 Reunión en la Universidad Nacional con docentes, egresados del Programa de Postgrado en Ing. Sanitaria y Ambiental (G. Rueda; L.S. Cadavid)
- 12:00 – 02:00 Almuerzo
- 03:00 – 04:00 Proyecto Modelación del Río Cauca PMC (C. Ramírez, Director Proyecto)
- 04:00 – 05:30 Presentación “La Unidad de Documentación en el marco del Grupo de Comunicación y Educación para el Desarrollo” (R. Galvis, Co-ordinador Grupo; L.E. Guiral, Co-ordinadora U. de Documentación)

Jueves 3 de Junio

- 08:30 – 09:30 Reunión con J. R. Caicedo, docente de Eidenar, próxima a finalizar estudios de PhD en UNESCO – IHE
- 09:30 – 10:00 Receso
- 10:00 – 11:30 Reunión con M. Peña e I. Restrepo, docentes de Cinara graduados de PhD en U. de Leeds, UK, con el apoyo del Convenio Univalle – IHE.
- 12:00 – 02:30 Almuerzo
- 02:30 – 06:00 Por confirmar

Viernes 4 de junio

- 08:30 – 12:00 Reunión sobre el Programa de Postgrado en Ingeniería Sanitaria y Ambiental (Co-ordina J.P. Silva)
- 12:30 – 02:30 Almuerzo
- 02:30 – 06:00 Taller con directivos, docentes y egresados del Programa de Postgrado en Ingeniería Sanitaria y Ambiental, bajo la co-ordinación de la misión de evaluación (J. P. Silva co-ordinará la participación de Univalle en esta actividad)

Lunes 7 de junio

- 08:00 – 09:30 Reunión con Acuavalle (C. Mira, Gerente de Acuavalle, D. Ramiro Corrales, Ingeniero Operativo de Campo)
- 09:30 – 12:00 Visita a Estación de Tratamiento de Aguas Residuales de Ginebra (Co-ordina C. Madera; J.R. Caicedo).
- 12:00 – 02:00 Almuerzo en Ginebra
- 03:00 – 05:00 Visita a Estación de Investigación de Agua Potable en Puerto Mallarino (Co-ordina L.D. Sánchez) Se buscará la participación de profesionales de Emcali

Martes 8 de junio

- 08:00 – 09:00 Reunión con ACODAL (L. Sánchez, Presidente; A.M. Escarria, Directora Ejecutiva; otros miembros de la Junta Directiva)
- 9:30 – 10:45 Reunión en CVC (M.C. Sandoval)
- 10:45 – 12:00 Reunión con el Centro Regional de Producción más Limpia CRPML (A.D. Jaramillo, Directora Centro Regional)
- 12:00 – 2:00 Almuerzo
- 02:00 – 03:45 Reunión con Eidenar (Co-ordina H. Materón, Director de Eidenar)
- 03:45 – 04:15 Receso
- 04:15 – 06:00 Reunión con el Instituto Cinara (Co-ordina E. Quiroga, Director Cinara)

Miércoles 9 de junio

- 08:30 – 10:00 Reunión sobre la propuesta de la Maestría en Ingeniería de Saneamiento Ambiental y Gestión para el Desarrollo (J. Latorre)
- 10:30 – 12:00 Proyectos Prodesal y PoWER (J. Latorre, co-ordinador Proyecto PoWER)
- 12:00 – 02:00 Almuerzo
- 02:30 – 04:00 Programa de Doctorado en Ingeniería (P. Torres, Vicedecana de Investigaciones Facultad de Ingeniería)

Jueves 10 de junio

- 08:30 – 09:30 Reunión con el Sr. Rector de la Universidad del Valle, Dr Iván Ramos C. y el Vice-Rector Academico, Dr
- 10:00 – 12:00 Revisión de documentos y elaboración del informe preliminar
- 12:00 – 02:00 Almuerzo
- 02:00 – 06:00 Revisión de documentos y elaboración de informe preliminar

Viernes 11 de junio

- 08:30 – 11:00 Revisión de documentos y elaboración de informe preliminar
- 12:00 – 02:00 Almuerzo

16:00 – 17:30 Reunión con el Comité de Co-ordinación del Convenio Univalle – IHE
(E. Quiroga; H. Materón; D. Castaño; J.P. Silva; J.L. García; A. Galvis) y el
Rector de la Universidad

17:30 – 18.30 Reunión con el Director Convenio Univalle – IHE (A. Galvis)

CONVENIO UNIVALLE - IHE

Postgraduate Capacity Building in Sanitary and Environmental Engineering in Colombia and the Wider Region - ESEE II (1999 - 2004)

Misión de Evaluación, en Cali, Colombia Junio 1° - 12 de 2004.
Dr. Marc P. Lammerink, Países Bajos; Dra. Doris Balvín, Perú
PERSONAS ENTREVISTADAS

Directivos Univalle

	Nombre	Institución	Cargo	Observaciones
1	Iván Ramos	Univalle	Rector Univeridad del Valle	
2	Fabio Zuluaga	Univalle	Vicerrector de Investigaciones	
3	Hector Cadavid	Univalle	Decano de la Facultad de Ingeniería	
4	Patricia Torres	Univalle	Vicedecana de Investigaciones Facultad de Ingeniería	

Comité Coordinación Convenio UV - IHE

	Nombre	Institución	Cargo	Observaciones
5	Alberto Galvis	Univalle	Director Convenio UV - IHE	
6	Edgar Quiroga	Univalle	Director Cinara	
7	Hernan Materon	Univalle	Director Eidenar	
8	Juan P. Silva	Univalle	Coordinador PISA	Egresado de Maestria PISA
9	Doralba Castaño	Univalle	Administradora Convenio UV - IHE	
10	Jose L. Garcia	Univalle	Docente Eidenar	

Docentes con estudios de PhD apoyados por el Convenio UV - IHE

	Nombre	Institución	Cargo	Observaciones
11	Julia R Caicedo	Univalle	Docente Eidenar	Egresada de MSc UNESCO - IHE. Candidata a PhD, UNESCO - IHE
12	Miguel Peña	Univalle	Coordinador Grupo de Saneamiento, Cinara	PhD, U de Leeds
13	Ines Restrepo	Univalle	Coordinador Grupo de Recursos Hídricos, Cinara	PhD, U. de Leeds

Otros Univalle / Cinara

	Nombre	Institución	Cargo	Observaciones
14	Joge Latorre	Univalle	Docente Cinara, Director de proyecto PoWER	Egresado Maestria UNESCO - IHE
15	Carlos Ramirez	Univalle	Docente Eidenar, Director del proyecto PMC	Egresado Maestria UNESCO - IHE
16	Hector Perez	Cinara	Asesor Cinara	Asesor en la formación de PISA
17	Rodrigo Galvis	Cinara	Coordinador Grupo de Comunicación y Educación	
18	Luz E. Guiral	Cinara	Coordinadora de la unidad de documentación	
19	Carlos Madera	Cinara	Ingeniero de Proyectos, Grupo de Saneamiento	Egresado Maestria UNESCO - IHE
20	Sandra Bastidas	Cinara	Profesional Grupo Participación y Gestion Comunitaria	

Egresados de programa PISA

	Nombre	Institución	Cargo	Observaciones
21	Fabiola Berón	Cinara	Coord. Estación de Investigación de Puerto Mallarino	Egresado de Maestria PISA
22	Germán Rueda	U. Nacional	Docente	Egresado de Maestria PISA
23	Luz E. Cadavid	U. Nacional	Docente	Egresado de Maestria PISA
24	Judith Rodriguez	U. Nacional	Docente - Directora de programa de Ing. Ambiental	Egresado de Esp. - Estudiante de MSc PISA
25	Nubia L. Becerra	-----	Profesional Independiente	Egresada de Esp. - Estudiante de MSc PISA
26	Noel Muñoz	Cinara	Profesional de Proyectos	Egresado de Esp. - Estudiante de MSc PISA
27	Julia Osorio	CRPML	Profesioal de CRPML	Egresada de Esp. - Estudiante de MSc PISA
28	Paula Vasquez	CRPML	Profesional de CRPML	Egresada de Esp. - Estudiante de MSc PISA

Representantes de Instituciones

	Nombre	Institución	Cargo	Observaciones
29	Luis G. Delgado	Emcali	Jefe Departamento de Producción de Agua Potable	
30	Maria C. Sandoval	CVC	Coordinadora de Recursos Hídricos	Coord. comité técnico proyecto PMC
31	Ana D. Jaramillo	CRPML	Directora del CRPML	Egresada de Especializacion PISA
32	Libardo Sanchez	Acodal	Presidente	
33	Angela Escarria	Acodal	Directora Ejecutiva	
34	Diego Corrales	Acuavalle	Profesional I, Proceso, Plantas, Control y Calidad	Egresado Especialización de PISA
35	Viviana Vargas	U. Nacional	Docente	Docente de PISA en el periodo 1994 - 2002
36	Arlex Saavedra	ASOMONTEBELLO	Administrador de Acueducto de Montebello	Lider de la comunidad de Montebello

ACODAL: Asociación Colombiana de Ingeniería Sanitaria y Ambiental

ACUAVALLE: Asociación de Acueductos y Alcantarillados del Valle del Cauca

ASOMONTEBELLO Asociación del Acueducto de Montebello

CINARA: Instituto de Investigación y Desarrollo en Agua Potable, Saneamiento Básico y Conservación del Recurso Hídrico

CRPML: Centro Regional de Producción mas Limpia

CVC: Corporación Autónoma Regional del Valle del Cauca

EIDENAR: Escuela de Ingeniería de Recursos Naturales y del Ambiente de Univalle

EMCALI: Empresas Públicas Municipales de Cali

PISA: Postgrado en Ingeniería Sanitaria y Ambiental

PMC: Proyecto de Modelación del Río Cauca.

PoWER: Partnership for Water Education and Research

UNESCO - IHE: Institute for Water Education

UNIVALLE: Universidad del Valle. Cali, Colombia

CONVENIO UNIVALLE - IHE

Postgraduate Capacity Building in Sanitary and Environmental Engineering in Colombia and the Wider Region - ESEE II (1999 - 2004)

**Mision de Evaluación, en Cali, Colombia Junio 1° - 12 de 2004.
Dr. Marc P. Lammerink, Países Bajos; Dra. Doris Balvín, Perú**

Listado de docentes de Univalle participantes del Taller Viernes 4 de Junio de 2004

Docentes de Cinara

- 1 Miguel Peña
- 2 Mariela Garcia
- 3 Jorge Latorre
- 4 Alberto Galvis
- 5 Carlos Madera

Docentes de Eidenar

- 6 Patricia Torres
- 7 Juan P. Silva
- 8 Luis F. Marmolejo
- 9 Julia R. Caicedo
- 10 Yesid Carvajal
- 11 Janeth Sanabria
- 12 Luz E. Barba
- 13 Camilo Ruiz

CINARA: Instituto de Investigación y Desarrollo en Agua Potable, Saneamiento Básico y Conservación del Recurso Hídrico

EIDENAR: Escuela de Ingeniería de Recursos Naturales y del Ambiente de Univalle

PISA: Postgrado en Ingeniería Sanitaria y Ambiental

UNIVALLE: Universidad del Valle. Cali, Colombia

ANNEX 4: LIST OF STAFF TRAINED AS PART OF ESEE PROJECT

List of staff having received staff training in the SAIL-funded project: "Education in Sanitary and Environmental Engineering (ESEE)" (phase I & II)

PhD studies of staff of Univalle supported by the agreement Univalle-IHE

Finalised:

- G. Galvis, U. de Surrey, UK, (1999)
- M. Peña, U. de Leeds, UK (2003)
- I. Restrepo, U. de Leeds, UK (2003)

In development:

- J.R. Caicedo, UNESCO – IHE, NL (2004)
- N. Urrutia, UNESCO – IHE, NL (2004)

Other PhD executed but without financial support from ESEE II

- P. Torres, U. de Sao Paulo, Brasil (2001)
- J. Díaz, U. Pol. de Madrid, España (2001)
- Y. Carvajal, U. de Valencia, España (2004)
- R. Molher, U. de Kassel, Alemania (2003)

J. Sanabria, U. de Laussane, Suiza (2003 – 2004), Postdoctorado

Other PhD in development without financial support from ESEE II:

- J. Rodríguez, U. de Sao Paulo, Brasil
- D. Vásquez, U. Andina Simón Bolívar, Ecuador
- M. Pérez, U. de Barcelona, España
- L. Escobar, U. Alcalá de Henares, España

ANNEX 5: THESES UNDER WAY AND COMPLETED

MSc en Ing. Sanitaria y Ambiental Información sobre las Tesis 1994 - 2004

Tesis	Participantes
Finalizadas	44
En ejecución	28
Suspendió estudios	13
Admitidos 2004	29
Total	114

Principales temas de investigación

- Tecnología para el mejoramiento de la calidad de agua para consumo humano
- Tecnología para el control de contaminación por aguas residuales domésticas
- Selección de tecnología en sistemas de potabilización de agua y en el control de contaminación por aguas residuales domésticas
- Alternativas para la administración de los servicios públicos
- Proyectos de aprendizaje en equipo

Principales temas de investigación (cont.)

- Tratamiento de aguas residuales
- Potabilización de agua
- Residuos sólidos
- Contaminación atmosférica
- Eco tecnología
- Hidroclimatología
- Ingeniería de ríos y costas
- Desarrollo de aguas y suelos

ANNEX 6: SHORT COURSES 1999 – 2003

Short Courses – 1999

Gestión para la Sostenibilidad en Programas de Abastecimiento de Agua y Saneamiento, Ecuador

Producción Mas Limpia, en Ecuador

Curso Taller sobre Diseño de Experimentos, en Colombia

Filtración en Múltiples Etapas, FiME, en Nicaragua

Short courses – 2001

Sistemas Integrados Sostenibles en el Tratamiento de Aguas Residuales, Colombia.

Producción mas Limpia, Ecuador

Gestión Comunitaria en la Prestación de Servicios de Agua Saneamiento en Pequeñas localidades, Colombia

Producción mas Limpia, el Camino hacia el Desarrollo Industrial Sostenible, Colombia

Mejoramiento de la Calidad del Agua para Consumo Humano, Guatemala

Evaluación y Optimización de Sistemas de Tratamiento de Agua, Colombia

Refresher Course on Water Quality Management Strategies, Colombia

Seminario Taller Internacional del Paternariado Científico Norte – Sur y Sur – Sur

Short Courses – 2002

Obras Hidráulicas Rurales, Bolivia

Gestión Integral del Tratamiento de Aguas Residuales, Perú

Gestión Integral de Residuos Sólidos Domiciliarios, Colombia.

Taller análisis e inventario de los problemas del Estuario del Río Guayas para la formulación de un plan de acción para su preservación ambiental, Ecuador

Seminario de Producción más Limpia aplicada a las PyMES, Colombia

Short Courses – 2003

Sistemas Integrados Sostenibles para el Tratamiento de Aguas Residuales y Opciones de Reuso, Ecuador

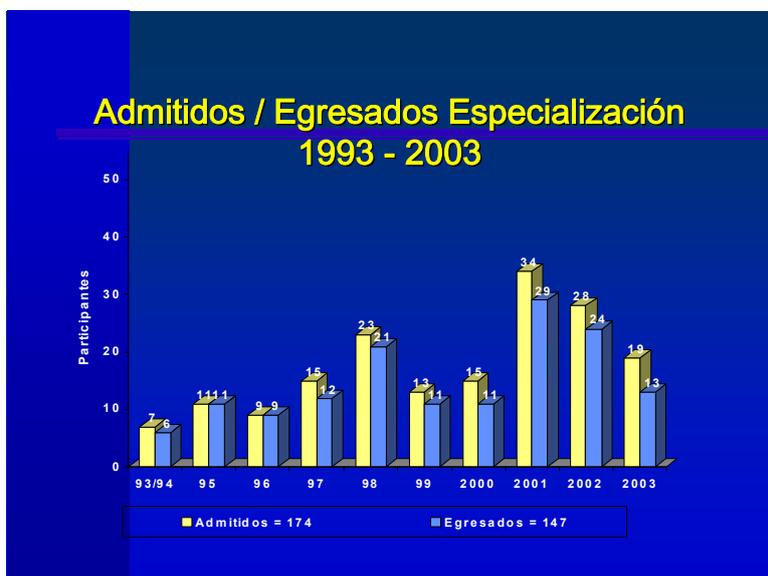
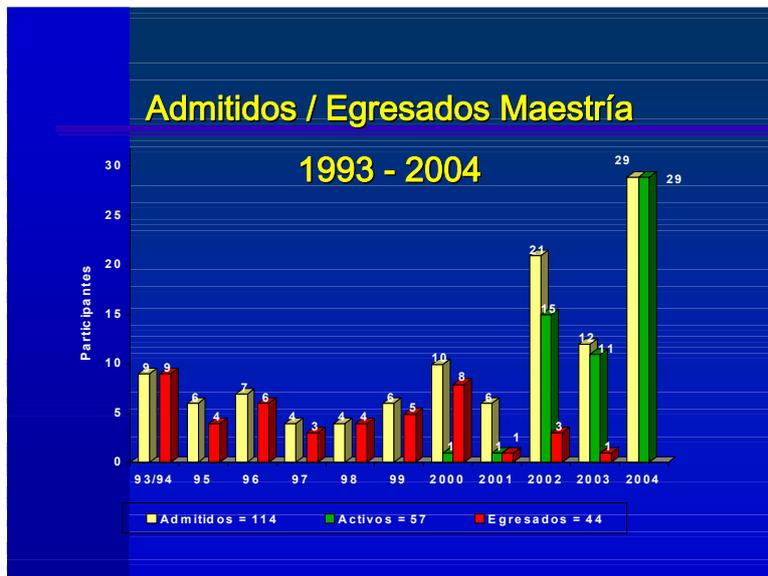
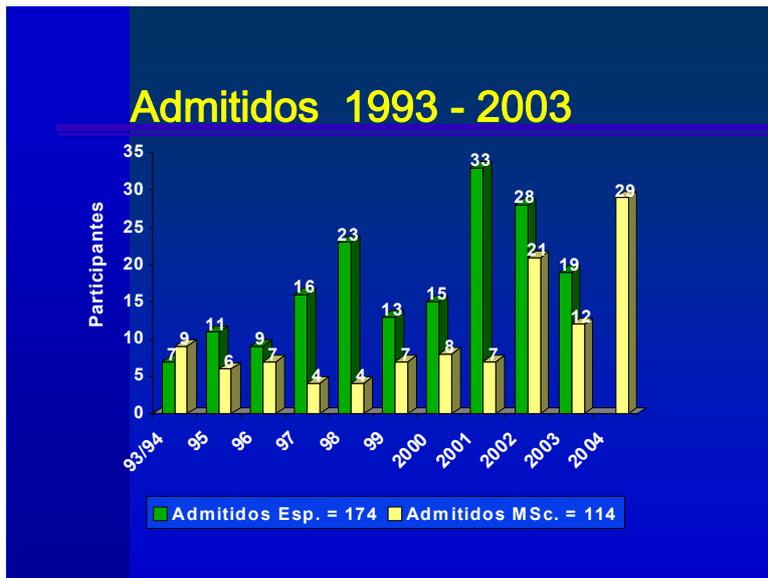
Conferencia Internacional Usos Múltiples del Agua: Para la Vida y el Desarrollo Sostenible, Colombia

La Hidroinformatica en la Gestión Integrada del Recurso Hídrico, Colombia

Métodos Naturales para el Tratamiento de Aguas Residuales Domésticas, Colombia

Transferencia de Información y Conocimiento en el Sector Agua, Colombia

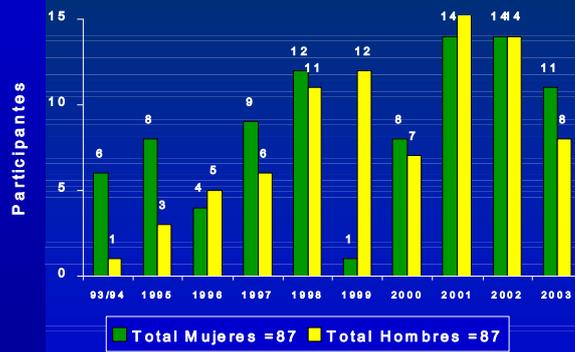
ANNEX 7: GRAFICS OF MAIN QUANTITATIVE OUTPUTS



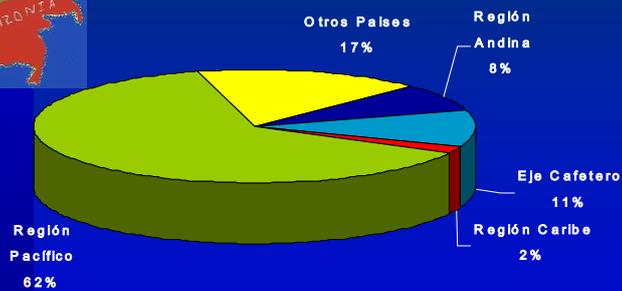
Género 1993 – 2003 Admitidos a la Maestría



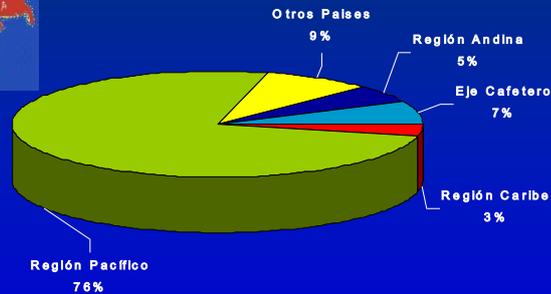
Género 1993 – 2003 Admitidos en la Especialización



Admitidos a la Maestría Distribución por región 1993 - 2004 Total de Admitidos: 114



Admitidos en la Especialización Distribución por región 1993 - 2003 Total de Admitidos: 174



Profesiones de los participantes de la Maestría 1993 - 2004

Área Académica	Profesión	Participantes	Total (114 admitidos)
Ingenierías	Ing. Agrícola	2	85
	Ing. Ambiental y Sanitaria	1	
	Ing. Civil	37	
	Ing. Geológica	1	
	Ing. Industrial	2	
	Ing. Minas	1	
	Ing. Química	16	
	Ing. Agrónomo	1	
	Ing. Ambiental y Recursos Naturales	1	
	Ing. Sanitaria	23	
Ciencias	Adm. Medio Ambiente	1	18
	Bióloga	7	
	Biología Marina	1	
	Ecología	1	
	Química	7	
	Zootecnista	1	
Licenciatura	Lic. Biología	2	11
	Lic. Biología y Educación Ambiental	1	
	Lic. Biología y Química	6	
	Lic. Química	2	

Profesiones de los participantes de la Especialización 1993 - 2003

Área Académica	Programa	Participantes	Total (174 Admitidos)
Ingenierías	Ing. Agrícola	5	135
	Ing. Catastral y Geodesta	1	
	Ing. Civil	64	
	Ing. de Minas	3	
	Ing. Forestal	1	
	Ing. Geológica	1	
	Ing. Industrial y Mecánico	1	
	Ing. Mecánica	1	
	Ing. Química	27	
	Ing. Sanitaria	30	
	Ing. Sanitaria y Ambiental	1	
Ciencias Básicas	Adm. de Empresas	1	28
	Adm. Medio Ambiente	2	
	Biología	7	
	Biología Marina	3	
	Ecología	2	
	Geología de Minas	1	
	Química	12	
Licenciaturas	Lic. Biología	3	11
	Lic. Biología y Educación Ambiental	1	
	Lic. Biología y Química	6	
	Lic. Química	1	

ANNEX 8: BIBLIOGRAPHY

Documents and Bibliography consulted:

- Direccion General de Agua Potable y Saneamiento Basico, *Sector de agua potable y saneamiento basica – retos y resultados*, Bogota, 2002
- *Informe de Coyuntura Economico Regional*, 2003
- Human Development Report for Colombia, *A cul-de-sac with ways out*, UNDP, 2003
- Ing. O. Samper, Ir. H.P.J. van Schaik, *Evaluation and Appraisal*
- CINARA, Universidad del Valle, *Análisis de la sostenibilidad en Sistemas de Agua y Saneamiento 43 proyectos en la zona rural de Nicaragua*, Unicef, ASDI gobierno de Suecia, Enacal. Cali, 2003
- All project related documents, like progress reports, articles, masters thesis and doctorate thesis produced, workplans, and evaluation reports



Core Team Evaluation SAIL Projects Programme

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Marc Lammerink (FMD Consultants), e-mail: fmd.nl@planet.nl

Cornélie van Waegeningh (EQUIP Worldwide), e-mail: equip.ww@equipworldwide.nl