
DAAD CALL

Higher Education *Excellence* in *Development* Cooperation
ex)(ceed II

FOLLOW-UP PROPOSAL
ON

SUSTAINABLE WATER MANAGEMENT IN DEVELOPING COUNTRIES (*SWINDON*)

Technische Universität Braunschweig

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MISSION STATEMENT

Although 70% of the earth's surface is covered by water, water reserves useable for mankind are vanishingly small. Of the 1.38 billion-km³ water available on earth, 97.4% are made up of the saltwater of the oceans, and are only available for anthropogenic use after immense technical and monetary efforts. Out of the remaining 2.6% of freshwater reserves (0.36 billion km³) 2% (0.28 billion km³) are stored in form of polar, marine, and glacial ice, and are thus unavailable for economic and, predominantly, ecological reasons. This leaves 0.6% (0.08 billion km³) in the form of ground and surface water, and soil and air moisture for usage by the rapidly growing human population.

It is estimated that almost 89% of the global population had access to an improved drinking water source in 2012. Nevertheless, 748 million people still lack access to an improved drinking water source. Further, one third of mankind does not have any sanitary facilities or wastewater disposal systems. Additionally, due to worldwide growth of population, the urbanisation, and industrialization of former rural areas, the demand for water resources has grown and becomes increasingly polluting. Consequently, less and less water will be available for other purposes, such as drinking water, fish farming, or irrigation. "Water" is undeniably at the heart of the post-2015 development agenda that puts therefore strong emphasis on environmental protection and sustainability. Here, the sustainable use of water is one of the most important issues for development cooperation.

The utilization scenarios that exist are manifold, and so are the academic disciplines, which have to cooperate to reach the provisions of the post-2015 agenda/Goal 6. Hence, the focus of cooperation in the research and development sector is on avoiding the overexploitation of resources and the contamination of water reserves, using concepts tailored to the needs of the relevant regions. In order to implement these concepts in the said regions, and to increase the acceptance measures taken within the respective cultural groups, socio-economic training concepts and tools have to be refined. In addition to the interdisciplinary and technological partners, it is inevitable to get local authorities, industries, NGOs, and policy makers involved in the research projects, in order to guarantee the necessary acceptance for the developed training opportunities and research results.

The requested project proposal builds on the structure of the previous project "Excellence Through Dialogue – Sustainable Water Management in Developing Countries" (SWM) and is entitled "Sustainable Water Management in Developing Countries" (SWINDON). The project proposal is submitted under the "Excellence Centres for Exchange and Development" programme "ex)(ceed".

I. OVERALL CONDITION AND KEY TO SUCCESS

It should be kept in mind that many projects in development cooperation fail for ignoring both the importance of socio-cultural aspects and consequent transfer of academic knowledge to practical application. In the majority of cases, those projects solely concentrate on scientific and technical problems. The end of the active involvement of experts from industrialised countries very often leads to failure in the implementation stage of a project. Especially projects related to water supply and usage gain little recognition if the various political, cultural, and social meanings of water in different areas and countries are not considered. Additionally the knowledge transfer to practice very often fails due to lack of programmes educating and training technical staff. This should not only be the responsibility of local authorities and politicians but also the responsibility of universities and institutions of higher education in the respective region and country.

There are many crucial aspects, which can be identified within this context, and have to be taken into account within the framework of development cooperation projects. However, three main crucial aspects should be mentioned here:

- The influence of innovations related to the societal context (Are the people willing to adopt and accept these innovations at all?)
- The interrelation of mental, institutional, and technical aspects, which underlie the innovation process (How do they influence each other?)
- In many cases an asymmetric initial position exists which arises from developmental gaps between partners, different cultural contexts or the teacher-student relations etc.

The TU Braunschweig actively encourages the involvement and participation of local stakeholders and politicians in order to attain support for the projects and thereby to ensure the success of the development cooperation in follow-up project "SWINDON". There is no doubt that the consideration of prevailing social

realities, cultural differences, educational standards of the respective countries, as well as the ecological and economic advantages of sustainability can be reached.

Consequently integrating scientific, social, and political competence, which is present in the current four SWM partner regions Latin America, Middle East, South-East Asia, and Sub-Sahara Africa, has been made one of the major tasks of the requested follow-up project. Hence, every partner region with its respective regional network will be responsible for enhancing the dialogue with experts from other research institutions, from state agencies, industries, and NGOs. The goal is to place water problems, which can be aptly described as “too much, too little, too dirty”, on the top of the agenda in order to develop sustainable strategies and tailored technical solutions helping to overcome the most urgent problems. In this respect, not only the SWINDON regional networks but also the entire SWINDON network will work on sustainable network structures, which will continue into the future even after the SWINDON project will have expired.

II. THE EXCELLENCE CENTRE “EX)(CEED” AT THE TU BRAUNSCHWEIG

II.1 SELF-CONCEPTION AND ROLE OF THE TU BRAUNSCHWEIG

As academic centre the TU Braunschweig (TUBS) is the decisive driving force that influences cultural and societal processes within the region. This is reflected by numerous contacts and exchanges with representatives from industry, state agencies, and society.

The TUBS maintains academic relationships throughout the entire world. There are 552 cooperation agreements with 396 institutions in 73 countries, facilitating the exchange of lecturers, students, and information in a number of key areas. Even so, TUBS signed several MoUs with *ex)(ceed* partner universities.

With focus on engineering and natural sciences, the TUBS aims at consequently using an interdisciplinary approach alongside appropriate methods and technologies dealing with the supply, usage, purification, and reutilization of water. Until now, the eminence of the topic »water« has become apparent mainly in developing countries. However, it will gain importance for the industrialized countries in the future, as well.

Because of its specific study programmes and research profile, the TUBS offers outstanding expertise in sustainable water management. Pioneering research and academic cooperation were established by the TUBS along with strategic partners from developing countries in these areas. Many interdisciplinary cooperation projects were and are focussed on wastewater irrigation in arid and semi-arid regions, wastewater treatment (chemical, biological, and engineering aspects), reuse of wastewater, as well as water management and water governance (social, political aspects). In many cases, special emphasis is laid on sustainable and transferable solutions for each country’s predominant water-related issues.

Within the frame of the SWINDON project, the TUBS acts as coordinating unit (CU) for the cooperation between partners in developing and industrialised countries. Due to its scientific and research focus, the project will be integrated into the Institute of Sanitary and Environmental Engineering and the Leichtweiß-Institute for Hydraulic Engineering and Water Resources (LWI), and will have access to their entire infrastructures. The institutes of Environmental and Sustainable Chemistry, of Geoecology, of Computational Modelling in Civil Engineering, of Geodesy and Photogrammetry, and of International Relations and Comparative Politics will contribute to the project through their expertise and respective experiences in teaching, doctoral training, and research with developing countries.

Further, TUBS as CU will contribute to the continuity of the SWINDON network and feels obliged to concentrate also on the stability and long-term perspective of the network. TUBS ensures that the same high quality standard of the network activities, which has been achieved jointly with all previous SWM partners, will be maintained. TUBS will also support activities that are focused on the self-preservation of the SWINDON network once the network is no longer funded by DAAD and BMZ.

II.2 STRATEGIC INTEGRATION OF SWINDON ON TUBS LEVEL

As a member of the group of “Technische Universitäten” in Germany, the TU Braunschweig with her core subjects in engineering sciences belongs to the top 9 of these universities.

The strategically relevant areas of research comprise “*Mobility, Infection and Active Substances*, as well as *City of the Future*”.

The area “*City of the Future*” also comprises urban living environments and integrates different engineering disciplines ranging from civil engineering to environmental engineering, water science, and engineering. Here, the Department of Architecture, Civil Engineering, and Environmental Sciences has taken over the initiative to develop a concept, which is in coherence with the new strategic orientation of the TU Braunschweig. The concept will not only refer to research but also to education. In this regard, the SWINDON project will be

attributed to the role of an internationally acting network, which can be strategically integrated whereupon all partners involved will gain mutual benefit because of development cooperation, research initiatives, and knowledge transfer. The “*City of the Future*” concept also ideally creates the opportunity to put the issue of “Sustainable Water Management” on the political agenda.

In the future, the most severe water-related problems will arise in future mega cities. Since years, it has become evident that more and more people will leave the rural areas due to increasing water scarcity, land erosion, and decreasing groundwater levels. Today already, the degree of urbanisation ranges between 60 and 80 % worldwide (source: CIA World Factbook 2013). It is estimated that within the next 35 years, in Asia and Africa the degree of urbanisation will approach 90 %.

III. PAST PERFORMANCE

III.1 PREVIOUS SWM PROJECT

The SWM project addressed the Millennium Development Goal MDG 7 “Ensure Environmental Sustainability - Halve by 2015 the proportion of the population without sustainable access to safe drinking water and basic sanitation”. In order to meet this overall objective SWM focused its core tasks on international cooperation and capacity building as well as on joint research in the area of sustainable water management.

Capacity building measures were to be carried out through the training of and networking between experts in developing countries and in Germany. The measures aimed at conveying competencies and knowledge regarding the subject matter of sustainable water management to future experts and decision makers. Further, it was to qualify them to shape economic, organisational and political change processes, thus ultimately attaining the MDG.

Working together in a net of regional partners from universities, public authorities and organizations, helped to build the necessary knowledge and competences. Such network activities were to guarantee the project’s long-term success. Nevertheless, the development of self-supporting structures especially comprising the knowledge transfer within academic and application-oriented fields was of main importance and thus characterised the joint approach used by the TU Braunschweig, the SWM project, and its partners in developing countries.

III.1.1 OUTCOME AND EFFECTS OF SWM

During the five years (2009 - 2014) of project work, the SWM project has led to the bundling of competences and to the emergence of a stable and globally acting network of partners. The present network consists of 35 partner universities in 18 countries on 4 continents.

Based on close collaborations, the SWM project through its topics (*i*) Water in agriculture in arid and semi arid regions, (*ii*) Water in Mega Cities, (*iii*) Water ecosystems and coastal engineering, (*iv*) Water and Health, and (*v*) Water in a Global World, gained competence particularly in capacity building, higher education, knowledge transfer, and research. The establishment of estimable study and research facilities in the field of sustainable water management resulted in reputable SWM regional networks crossing international borders.

The established SWM network reached a widely recognised status within each member country and university. This is not ascribed solely to scientifically treated aspects like water usage, wastewater treatment, water reuse and irrigation, pollution control, water and health, and water management, but also to the educational aspects that particularly relate to continuously increased numbers of exchanged PhD and MSc students, who were integrated into running research projects at the hosting universities. Finally yet importantly, the well-established cooperation structures and the ability of the hosting SWM partner institutions to provide capacity in relevant research topics had and still have a considerable share in this development.

The SWM project and network has continued to create an added value that is more than the sum of the individual contributions of the participating institutions alone. The meanwhile established recognition of *ex)ceed*’s role and the SWM project has led to some reports in print and electronic media; e.g., during the regional workshop on “Wastewater Treatment and Reuse” (June 02-06, 2013) in Konya and during the summer school on “Coastal Erosion and Management for Safer Coasts in a Changing Climate (CEMSAC)” in Recife (September 09-22, 2013). The invitation to the Conference of Vice Chancellors and Deans of Science, Engineering and Technology (COVIDSET) in Botswana proves the created added value, additionally.

Strengthening and extending capacity building has particularly made progress in the field of student education and expert exchange. Students from partner universities now have access to a curriculum database, which gives them the opportunity to search for detailed information about different MSc and PhD courses

offered by partner universities within the *SWM* network. The students get a comprehensive survey of courses in engineering, natural, and social sciences dealing with sustainable water management. At the same time, the partner universities can compare their education performance with that of other partners in the network. Additionally, the joint development of a model master curriculum based on this database provides a helpful tool and aid for orientation possibly required if a new master programme is planned. Currently, the Mekelle University in Ethiopia is preparing a proposal to apply for a UNECSO Water Chair. In this context, the curriculum database and the proposed model master curriculum could particularly help to work out a tailored master curriculum on “Sustainable Water Management” at the Mekelle University.

III.1.2 QUALITY FEATURES OF *SWM*

In general, the results of the TU Braunschweig’s development cooperation project *SWM* on sustainable water management can be characterised by four qualitative criteria: transferability, reciprocity, networking, and successful implementation. The measures and project results are transferable through degree programmes, research projects, and technology transfer to similar climate zones and regions with similar needs.

The excellence within the development cooperation between the TU Braunschweig and *SWM* partner institutions in developing countries as well as between the *SWM* partner institutions in developing countries themselves is particularly distinguished by reciprocity, with all parties profiting from joint activities. Within the established *SWM* networks, the exchange of graduates, doctoral candidates, and researchers have led to a sustainably growing crystallisation point and assures excellence in the education of teaching and research staff for developing countries, as well as to individual contacts for future cooperation of all network members. This future-oriented aspect of development cooperation is already manifested in established links built not only between the TU Braunschweig and its *SWM* project partners, but also between *SWM* project partners in developing countries comprising higher education institutions as well as research institutions, public authorities, ministries, and companies as well as associations.

III.2 FROM *SWM* TO *SWINDON* PROJECT

The *SWINDON* project is not meant as a one-to-one continuation of the *SWM* project. However, there are tried-and-trusted measures and tools such as summer schools, expert workshops, regional training courses, and exchanges of graduates and teaching staff that will certainly continue to play an important role. Further, *SWINDON* also continues fostering the existing *SWM* network and ensuring the successful interdisciplinary cooperation on the field of sustainable water management. Nevertheless, the quality features of *SWM* serve as further basis for *SWINDON*.

The existing *SWM* network has led to strong cooperative partnerships and created an added value. Therefore, the network partners mentioned in the previous project support this follow-up proposal. Based on these ideal start-up conditions and on the bases of the experiences made during the period of the *SWM* project, the *SWINDON* project will particularly focus on the following points:

- Sustainable water management as a matter of the political agenda;
- Enhanced visibility of the *SWINDON* project at the member institutions and outside academic society within the region;
- Strong promotion and enhancement of joint research initiatives and publications;
- Network sustainability (strong promotion of the self-reliance and self-preservation of the regional networks and the responsibilities of the regional coordinators): In the past, it became apparent that with reference to the sustainability of the *SWINDON* network, the role of active members must be strengthened while taking over more responsibility for the regional network. In view of their capacities and potentials these members are of importance as they can decisively contribute to keep the network alive even after the *SWINDON* project has expired;
- Enhancement of project effectiveness (measures are planned with a clear target-setting that has recognisable links to output and outcome).

IV. CONCEPT OF *SWINDON*

IV.1 PROJECT OBJECTIVES AND FOCUS ON MDG 7 AND POST-2015 AGENDA

Just like the previous *SWM* project, the overall strategic goal of the *SWINDON* project is to contribute to the shaping of future subjects and scenarios through active cooperation between developing and industrialized countries. The project will continue focussing its activities on MDG 7 and on post-2015 agenda/Goal, and especially on the sub-target of embedding the principles of sustainable development into the politics of the

respective countries in order to reverse the loss of environmental resources like potable water. By putting the topic of sustainable water management on the political agenda of both industrialized and developing countries, and to work on administrative and societal frame conditions necessary for implementation, the project strategy of SWINDON is aligned to work on short-term successful outcomes and to assure long-term development through a sustainable network and knowledge transfer within the field of water.

As previously mentioned, the SWM project has established a stable und well-functioning partner network consisting of 35 universities in 18 countries on four continents. The major success of the network is attributed to close interdisciplinary cooperation in the field of sustainable water management. The SWINDON project builds on this success and continues supporting the interdisciplinary research work on water-related problems by connecting aspects from natural, engineering, and social sciences.

Furthermore, the SWINDON project continues with measures that have been proved by project areas like capacity building, higher education, knowledge transfer, networking, and research. New focus will be on strategic objectives comprising network effectiveness, visibility, and network sustainability.

The network effectiveness is determined by comparing the clearly formulated target-setting with the actually achieved outputs and outcomes of the respective project measure. For example, a clear link (red thread) between the thematic orientation and the output and outcome of an expert workshop must be recognisable. This shall also be applicable to all further project measures (Table 1).

The obligatory involvement of media in project measures like summer schools and expert workshops shall contribute to increase the visibility of the SWINDON project. Additionally, the consequent involvement of professionals from state agencies (local authorities), politicians, and NGOs will help to increase the visibility.

In order to achieve the above-mentioned new strategic objectives few optimisation steps must be carried out which are related to the project areas: network, knowledge transfer, higher education/capacity building, and research.

Table 1: Overview of overall project objectives, strategies, areas, and measures

Overall project objectives				
<ul style="list-style-type: none"> ▪ Contributing to post-2015 agenda/goal 6 through cooperation at eye level between Germany and the developing countries within the framework of the SWINDON project ▪ Building capacities in developing countries and in Germany in the field of Sustainable Water Management ▪ Putting the topic of Sustainable Water Management on the political agenda in the developing countries and in Germany ▪ Further increase of project effectiveness and network visibility ▪ Developing structures and instruments for a sustainable network (self-preservation of the network) 				
Strategies to be jointly developed for:				
Building a consolidated and sustainable network consisting of “full” and “associate” members organised in regional networks with trans-national coordination by TUBS	Establishing adequate knowledge transfer and educational tools available for professionals, teachers, and graduates in all regions	Developing/perfor ming joint research projects with partners from developing countries and Germany in the field of sustainable water management	Creating a pool of experts with much-needed know-how for higher education and research institutions, industry, politics, and for identifying priority topics and planning technical contents of workshops	Further development of the curriculum database and development of an expert database making both available for higher education, capacity building, and development of graduate curricula on sustainable water management
Project areas and measures				
Areas		Measures		
<ul style="list-style-type: none"> ▪ Network ▪ Capacity Building / Higher Education ▪ Knowledge Transfer ▪ Research 		<ul style="list-style-type: none"> ▪ “Active” summer schools ▪ Expert Workshops ▪ Regional Meetings ▪ Training Courses ▪ Exchange of Graduates ▪ Teacher Exchanges ▪ Curriculum Database ▪ Expert Database 		
		<ul style="list-style-type: none"> ▪ Expert Working Groups ▪ Management Board Meetings ▪ Coordination Trips ▪ Joint Research Proposals ▪ Joint Publications ▪ Thematic Research Clusters ▪ Competence Centre Concept for Further Education (CoCCo) ▪ Pool of Senior Professors 		

IV.2 PROJECT AREAS AND MEASURES

IV.2.1 NETWORK

During the run of the *SWM* project, it became apparent that the number of 35 network partners represents a maximum limit beyond which the financial and administrative issues will lead to increasing problems. Thus, in order to find a solution for this limitation and to enable possible inclusion of members from least developing countries, the consolidation of the network is proposed by introducing “full” and “associate” membership. In this context, the term “partner” is replaced by the term “member” and expresses the binding to the *SWINDON* network that is based on close cooperation among each member of the regional centres. A member in the first place is the University or one of its institutional units (e.g. Department, School, Chair, etc.). It can also be a research institute and/or state research institution. The introduced status of full membership is to strengthen the influence of particularly active members. According to their potentials and capacities, these members become reliable figures for contributing to the sustainability of the network.

The status of membership is based on very few criteria suitable for evaluating the activities of the members. This includes the number of activities, offering university capacities, participations in workshops, number of joint publications or activities for joint research initiatives. For *SWINDON*, each regional centre proposes a list of candidates for “full” and “associate” membership to the management board for final decision-making. The list can be revised by the regional coordinator each year and has to be submitted to the management board for approval. In order to be able to start with *SWINDON* activities from the very beginning, each of the *SWINDON* regional centres has drawn up a list of full and possible associate members as a contribution to the follow-up proposal. Here, the full members have signed letters of intent, which are attached to the annex.

The main task of the full members will be to contribute actively to increase the visibility of the network while establishing contacts to other regional and international networks, and stakeholders from industry, local authorities, or state agencies. Besides this task, full members also have the responsibility to work on structures and measures assuring the stability and the financial sustainability of the regional and the entire *SWINDON* network. A measure for assessing the success will be the type, quality, and number of cooperation and research initiatives with members from universities, companies, and/or state agencies. For example, one type of cooperation could be associated with a practice-oriented project launched, together with NGOs, companies, and/or state agencies. Full membership also means to have full access to all project activities and measures. Associate membership is subject to certain restriction such as participation in regional meetings and plenary meetings. Nevertheless, associate members are called to give substantial contribution to the *SWINDON* research topics, to participate in joint research initiatives, to offer university resources, and to participate in student and teacher exchanges. In view of these regulations and the possibility to receive full member status in certain cases, incentives are created to increase network activities, and competition among the members is stimulated.

The concept of associated membership is not in contradiction to the recommended consolidation of the entire network. The core group of full members that is finally representing the entire *SWINDON* network consists of the full members belonging to the four regional networks, and the members at TUBS. The full members of the regional networks introduce associate members that were selected and approved according to the regulations mentioned above. In case of associate members who are very active and substantially contributing to the network, the management board can decide to assign full member status. The decision requires the agreement and positive vote of all management board members including the Chairman of the *SWINDON* project.

The concept of associated membership is further to contribute to (i) internationalisation at the *SWINDON* member institutions and, (ii) to improve the performance of, the capacity building at and the knowledge transfer between the member institutions. This concept is expected to create a close grid of interacting members who are able to contribute to the stabilization and sustainability of the entire network by the sum of their expertise and capacity.

In order to improve the visibility of the *SWINDON* network, each region should have its own website integrated into the main project website. Each regional coordinator shall update this regional website regularly. Furthermore, each *SWINDON* member institution shall create a link to the main website and the regional website. During the workshop on the follow-up proposal at TUBS in February 2014, the *SWM* Management Board agreed upon the proposal that the regional coordinator from Middle East takes over responsibility for the administration and updating of the “main” project website. Further, the regional coordinators will take over responsibility for the implementation of “region-related” project websites that are linked to the “main” project website. By these websites, information about available capacities of every single

member institution shall also be provided. In this regard, available capacities are assigned to experts as well as to instrumental and laboratory resources. Hereby, members, who want to organise a summer school or a regional training course, will be informed about possibly available equipment, which could help to overcome the lack by exchange of resources.

In order to support alumni activities the new project website includes a password-protected area where participants of *SWINDON* events have the opportunity to exchange experiences, and to maintain old and create new contacts.

IV.2.1.1 NETWORK COMPETENCE AND POLITICAL ISSUES

On political level, disputes on sustainable water management are often related to exploitation of water resources, groundwater protection measures, fair distribution of water resources, wastewater treatment and reuse, and water quality and health. Especially in developing countries, exploitation of water resources and discharge of highly polluted wastewater into the environment are most challenging and often overstrains state or local authorities due to lack of capacities and regulations. Accordingly important is to act and to develop management strategies for every-day-use of water and treatment of highly polluted wastewater discharged. At that point, risk assessment studies defining methodologies and developing risk management strategies and easily usable decision-making tools are ideally suited to engage dialogues with local or state authorities responsible for water management, water treatment, and water quality. The *SWINDON* network possesses the competence to offer such tools and to solve water problems that are an issue on the political agenda in almost all developing countries. Thus, the strategy of the *SWINDON* project will be to sensibilise politicians and authorities on decision-making level, but to also offer support and to present the “portfolio of competences” of the *SWINDON* network. Each regional network has its individual portfolio of competences that can be published in a brochure and on the main website. The main actors will be the members of each regional expert working group and *SWINDON* experts that take part in the thematic research clusters. By strategic selection of state or local authorities (politicians) and invitation to the expert workshops or summer schools, the attempt is to be made to seek cooperation partners within this target group and to inform about the portfolio of competences.

With regard to the post-2015 agenda, the international community is engaged in an intense debate about what development model will best serve to cope with global challenges like climate change and the economic, water, energy, and food crises. However, critics emphasise in particular that the MDGs were imposed in a top-down fashion by the rich industrialised countries of the global North, while the countries of the global South bore sole responsibility for making sure the goals were implemented. The *SWM* project never followed the top-down fashion. Like the predecessor *SWM* project, the *SWINDON* project will focus on good project governance, which distinguishes itself with cooperation on eye level.

The post-2015 development agenda is slated for carrying on the work of the MDGs and integrate the social, economic, and environmental dimensions of sustainable development. Within its capacity, the *SWINDON* project will contribute providing solid foundation for the post-2015 development agenda.

IV.2.2 CAPACITY BUILDING / HIGHER EDUCATION

Just like the previous *SWM* project, the exchange of PhD, MSc students, teaching staff and experts is regarded as an important measure for contributing to the exchange of knowledge, to the teaching of students, and to broadening the student’s educational horizon (e.g. summer schools). The exchange of teaching staff and experts working on different research fields guarantees a valuable increase of qualified graduate education. Hence, the continuation of these measures will be encouraged.

In the future, more emphasis will be laid on south-south exchanges. The improvements will not be in terms of the number of south-south exchanges, but also to the duration of the stay at the hosting *SWINDON* member institution. The period for staying abroad is to range predominantly from 6 to 12 months.

The extension of course offers within the curriculum database (CDB), which was devised and technically designed during the *SWM* project phase of, will help students to search for courses appropriate for their graduate education. It helps to get a comprehensive survey of courses in engineering sciences, natural sciences, and social sciences aspects dealing with sustainable water management. Further, the database tool facilitates the search for a suitable hosting university, which offers courses of interest and helps to complete or consolidate students’ graduate studies.

The extension of detailed and comprehensive information about the courses allows analysing to what extent water-related aspects in engineering and natural sciences, social sciences, and management are covered by courses of the *SWINDON* member universities. This analysis will also provide an opportunity to identify gaps in own graduate education on water science in general and on *SWM* in particular. Furthermore, the database

information serves as a source for structuring and developing master curricula on *SWM*. An important aspect refers to the comprehensive offer of training courses. Here, the CDB is of particular interest to member institutions that strongly focus on training courses being part of their graduate education. In this respect, the CDB as information and optimisation tool has the potential to essentially improve capacity building on south-south level.

By agreement of all members of the Management Board during the follow-up workshop at TUBS in February 2014, the member institution (University of Akdeniz) and the regional coordinator of Middle East was appointed to take over responsibility for the future maintenance and updating of the CDB.

IV.2.3 RESEARCH

The *SWINDON* project strongly supports the establishment of expert working groups in each of the regional centres and clearly accentuates the aspect of research within the project. In this context, main emphasis shall be laid on practice-oriented research topics dealing with sustainable water management. During their first regional meetings, the regional centres elect the members of the expert working group; ideally, one expert per defined main research topic given in Table 2.

Table 2: List of research topics (in bold letters) and associated subtopics defined by each regional centre

LA	ME	SEA	SSA
<p>Coastal engineering:</p> <ol style="list-style-type: none"> 1. Coastal protection; 2. Coastal ecosystems <p>Environmental engineering:</p> <ol style="list-style-type: none"> 1. Process integrated industrial wastewater treatment; 2. Groundwater pollution / treatment <p>Sanitary engineering:</p> <ol style="list-style-type: none"> 1. Wastewater treatment <p>Assessment of water quality:</p> <ol style="list-style-type: none"> 1. Chemical analysis and methods <p>Physical-chemical treatment of organic pollutants in wastewater:</p> <ol style="list-style-type: none"> 1. Catalysis; 2. Photocatalysis and Electrophotocatalysis for degradation of organic pollutants 	<p>Urban water management:</p> <ol style="list-style-type: none"> 1. Waterloss management in water supply systems; 2. Water quality in water supply systems <p>Water demand management:</p> <ol style="list-style-type: none"> 1. Agriculture, domestic, industrial water demand management; 2. Impacts of climate change on water resources; 3. Application of water footprint methodology as decision support tool for water allocation/management task <p>Water pollution and health:</p> <ol style="list-style-type: none"> 1. Emerging pollutants; 2. Wastewater management and reuse 3. Water Governance 	<p>Water resources management:</p> <ol style="list-style-type: none"> 1. Water and agriculture; 2. Water security; 3. Water footprint; 4. Water availability; 5. Water harvesting; 6. Water Governance <p>Wastewater management:</p> <ol style="list-style-type: none"> 1. Material flow management and resource economy; 2. Wastewater management and agriculture; 3. Water quality and pollution, water and wastewater treatment <p>River basin and natural disaster management:</p> <ol style="list-style-type: none"> 1. River basin management, Water allocation and management; 2. Coastal zone management; 3. Transboundary water management; 4. Natural disaster management for water; 5. Urban flood management <p>Water, energy and climate change:</p> <ol style="list-style-type: none"> 1. Water and energy nexus; 2. Water and climate change 	<p>Environmental engineering and process chemistry:</p> <ol style="list-style-type: none"> 1. Industrial and domestic wastewater treatment; 2. Groundwater pollution / treatment <p>Water demand management:</p> <ol style="list-style-type: none"> 1. Agriculture, domestic, industrial water demand management; 2. Impacts of climate change on water resources <p>Monitoring and assessment of water quality:</p> <ol style="list-style-type: none"> 1. Chemical analysis and methods 2. Bioindicators <p>River Basin engineering:</p> <ol style="list-style-type: none"> 1. Floods management; River basin ecosystems; 2. Socio economic aspect of water resource management (water governance)

Each regional expert working group (REWG) defines their specific topics that serve as basis for the technical and contents-related orientation and planning of the summer schools, expert workshops, and regional training courses. With respect to joint research proposals and research cooperation, the REWGs are responsible for developing ideas and proposals for interdisciplinary treatment of water-related problems. Further, the REWGs are responsible for contacting and exchanging knowledge regularly. As several research topics of the regional

centres overlap (Table 2) it does make sense that the REWGs regularly contact each other. This can easily be done via the newly created information platform on the present *SWM* website. The REWG will also have the task to work actively on publishing *Special Issues* in *CLEAN - Soil, Air, Water* or in other international high-ranked journals. The Special Issue, for example, could be a selection of best paper contributions to specific topics to be dealt with at regional expert workshops or summer schools.

With regard to higher education, every REWG has the obligation to contribute to the adaption of master curricula or the development of new master curriculum concepts in the field of sustainable water management. In this context, the curriculum database will serve as a useful tool.

In order to generate incentives for joint research initiatives, the *SWINDON* project will financially support necessary preparatory work for a joint research proposal. The preparatory work is carried out on bilateral (or later on trilateral) level. The time given for the preparatory work is one year. The financial support covers costs for travelling and accommodation of one PhD student or Post-Doc for each partner of the cooperation, which also includes short visits of the corresponding supervisors. Additional funding can be provided for preliminary investigations to be carried out in the laboratory or in the field. This new instrument for promoting research will replace the former Guest Chair and Guest Chair Team.

Every year, two research proposals will be supported in this way. The *SWINDON* management and international advisory boards review the proposals and select the two best proposals, finally.

IV.2.3.1 Interdisciplinary Research

Agriculture uses up 65% of the freshwater reserves worldwide, but only a small amount is actually taken up by the plants. The larger part is dissipating into the atmosphere through evapo-transpiration, or seeps away into the ground. Since the water used is mainly drawn from the aquifer, the result is a drawdown with drastic consequences, such as desertification in semi-arid regions or ground instability and subsidence in mega-cities. Water is scarce also in the seemingly water-rich regions of the world. An unregulated use of fresh water and insufficient treatment of wastewater from industry and households lead to the pollution of inland and coastal waters, degrades them ecologically, renders them useless for other forms of utilization, and also causes diseases in many cases. Countries in Southeast Asia are confronted with yet another problem, which constrains the utilization of available water. The Mekong, as one of the largest rivers in the world, as well as several other rivers of the region, flows from the Himalayan region. Due to processes of climate change, increased melting of glaciers contributes to natural erosion. Toxic heavy metals ions and metalloids like arsenic are washed out to a considerable extent, thus contaminating the surface and ground waters of countries as far away as Vietnam. Millions of people in Bangladesh, Burma, Thailand, Laos, Cambodia, and Vietnam are affected by this kind of contamination. The low rate of sewage water treatment adds to the problem, rendering fresh water supply and sewage water disposal significant environmental and health risks.

Particularly, in regions where even and fair water distribution is an additional problem to water scarcity and water pollution, the political and socio-economic aspects join alongside the natural and engineering science disciplines. After all, most of the worldwide biggest rivers flow through more than one country. In the light of this fact, the trans-national interdisciplinary treatment of water-related problems is obvious and inevitable. For that reason, the research activities among the network members also concentrate on interdisciplinary cooperation.

If one compares the main regional research topics and subtopics, which were proposed by the four regional centres, and assigns them to the *SWINDON* research topics, many thematic overlaps between the regional centres can be identified (Table 3).

Table 3: Overall *SWINDON* research topics connecting regional centres

Regional Centres	Water Management, Water Quality & Water Chemistry	Water in Agriculture and Ecosystems	Water in Coastal and Urban Areas & Environmental Engineering	Water and Health	Water Governance, Socio-economic aspects
LA	X		X		
ME	X	X	X	X	X
SEA	X	X	X	X	X
SSA	X	X	X		X
TUBS	X	X	X	X	X

This fact facilitates joint international cooperation and opens many opportunities to define thematic target points for joint research initiatives and to establish trans-regional thematic and interdisciplinary research

clusters in the field of sustainable water management. Here, for example, tailor-made concepts that deal with specific water-related problems and practice-oriented solutions are of particular interest. Furthermore, the thematic research clusters are expected to enhance joint research cooperation among the *SWINDON* members and finally contribute to strengthening the operational sustainability of the network.

According to Table 4, the *ex)cced* centre at TUBS links to the entire *SWINDON* network based on a number of interdisciplinary areas and acts as multiplier for further links between south-south project members.

Table 4: *SWINDON* research topics and links between project members

Main Research Topics of the <i>SWINDON</i> Project	Research Groups		
	TU Braunschweig (Scientists)	<i>SWINDON</i> Members (Universities)	Research Areas
1. Water Management, Water Quality & Water Chemistry	Water Management, Flood Risk (Prof. Meon)	Hanoi Water Resources University, AIT Bangkok	Water resources management; River basin and natural disaster management; Flow forecast
	Environmental and Sustainable Chemistry Prof. Bahadir, Dr. Kolb	Konya NE University, Akdeniz University, Mutah University, Mansoura University	Waterloss management in water supply systems; Water quality in water supply systems; Assessment of water quality; Water pollution in Nile Delta Region; Wastewater reuse in agriculture
		University of Ouagadougou	Monitoring and assessment of water quality; Chemical analysis and methods; Pesticide residues in food net
	Sanitary Engineering Prof. Dichtl, Prof. Dockhorn	Tongji University	Water and wastewater resources management
	Geodesy, Remote Sensing Prof. Niemeier	UNAM, University of Guadalajara	Subsidence detection and monitoring in Mexico City
	Waste Management, Landfilling (Prof. Fricke, Dr. Münnich)	PUC Rio, Federal University of Rio	Groundwater pollution & treatment; Waste and resource management
	Bioindication Prof. Suhling	University of Botswana / Maun, University of Ouagadougou	Water quality assessment with biological methods
	Water Quality Prof. Meon	Hanoi Water Resources University, University of Ho Chi Minh City	Hydrodynamic and water quality modeling and management of water bodies
Main Research Topics of the <i>SWINDON</i> Project	Research Groups		
	TU Braunschweig (Scientists)	<i>SWINDON</i> Members (Universities)	Research Areas
2. Water in Agriculture and Ecosystems (tropical, arid, semi-arid areas)	Environmental and Sustainable Chemistry Prof. Bahadir	Mutah University, Konya NE University	Water pollution and health; Wastewater management and reuse
		Sanitary Engineering Prof. Dichtl, Prof. Dockhorn	Bogor Agricultural University,
		PUC Rio	Sanitary engineering

Table 4: continued

Main Research Topics of the SWINDON Project	Research Groups		
	TU Braunschweig (Scientists)	SWINDON Members (Universities)	Research Areas
2. Water in Agriculture and Ecosystems (tropical, arid, semi-arid areas)	Hydrology, Groundwater Modelling Prof. Schöniger	UNAM, University of Guadalajara	Groundwater flow, pollution transport and treatment
	Water Quality Prof. Meon	Hanoi Water Resources University, University of Ho Chi Minh City	Water balance and material flow from catchment to rivers
	Remote Sensing Prof. Niemeier	Tongji University	Hyperspectral satellite data analysis for the estimation of surface parameters
	Geoecology Prof. Schröder, Prof. Suhling	UNAM, University of Pernambuco	Coastal ecosystems
		University of Botswana / Maun	Ecosystem functions of freshwater systems in river catchments Assessment of biodiversity, environmental health and ecosystem services of freshwater ecosystems
Bioenergy Prof. Fricke, Dr. Münnich	University of Guadalajara	Biogasproduction from waste	
Main Research Topics of the SWINDON Project	Research Groups		
	TU Braunschweig (Scientists)	SWINDON Members (Universities)	Research Areas
3. Water in Coastal and Urban Areas & Environmental Engineering	Bioprocess Engineering Prof. Haarstrick	University of Guadalajara, University of Sao Paulo	Environmental engineering; Process integrated industrial wastewater treatment; Groundwater pollution & treatment
	Hydrology, Groundwater Modelling Prof. Schöniger	University of Guadalajara, UNAM	Groundwater flow, pollution transport and treatment
	Wastewater Treatment Prof. Dichtl, Prof. Dockhorn	University of Guadalajara, PUC Rio, University of San Juan	Process integrated industrial wastewater treatment; Wastewater treatment
	Management system and urban flush floods Prof. Meon	AIT Bangkok, University of Ho Chi Minh City	Managing system for sustainable improvement of water quality of coastal water bodies; Risk mapping of urban areas und flush flood risk
	River Management, Flood Control Prof. Dittrich	University of Ouagadougou, University of Kara, University of Lome	River Basin engineering; Floods management
		Hanoi Water Resources University, AIT Bangkok	Urban flood management; River basin management
	Coastal Ecosystems Prof. B. Schröder , Prof. Oumeraci	UNAM, University of Pernambuco	Coastal protection; Coastal ecosystems
	Coastal Engineering Prof. Oumeraci	UNAM, University of Pernambuco	Coastal protection; Coastal morphodynamics
	Sanitary Engineering Prof. Dichtl, Prof. Dockhorn	University of Maseno	Environmental engineering and process chemistry; Industrial and domestic wastewater treatment

Table 4: continued

Main Research Topics of the <i>SWINDON</i> Project	Research Groups		
	TU Braunschweig (Scientists)	<i>SWINDON</i> Members (Universities)	Research Areas
4. Water and Health	Landfill Engineering Prof. Fricke, Dr. Münnich	PUC Rio, Sao Paulo	Waste management, landfill operation and risk assessment
	Environmental and Sustainable Chemistry Prof. Bahadir	Konya NE University, Akdeniz University, Mansoura University, Mutah University	Water quality in water supply systems; Pollution of surface waters with pharmaceutical residues; Water born diseases in the Nile Delta Region
	Wastewater Treatment Prof. Dichtl, Prof. Dockhorn	Hanoi Water Resources University	Water quality and pollution, water and wastewater treatment
		University of Konya, Akdeniz University	Water quality in water supply systems
5. Water Governance & Socio-Economic Aspects	Transboundary River Basins Prof. Menzel	Ain Shams University, Bahir Dar University, University of Ouagadougou, AIT	Transboundary water problems
	Water Footprint Prof. Menzel	Akdeniz University, University of Jordan	Application of water footprint methodology as decision support tool for water allocation/ management task
	Water and Culture Prof. Menzel	University of Guadalajara	Water, Environment, and Sustainability

IV.2.4 KNOWLEDGE TRANSFER

The measures, which enable students and *SWINDON* project members to share knowledge with each other, are the summer schools, the expert workshops, and the regional training courses. During the project period of *SWM*, these measures turned out to be quite successful. For that reason, the *SWINDON* project will continue with these measures, but will also involve an expert working group that is responsible for the thematic and technical orientation of water-related topics in each of the regional centres. The expert working groups select these topics while considering scientific but also regional and practice-oriented problems.

Particularly, the expert workshops are considered an important measure and platform for the exchange of knowledge between *SWINDON* project members and representatives/experts from NGOs, state agencies, and industry. They can contribute to establish close contacts and may open doors for joint projects. For that reason, the invitation of these representatives or experts should be obligatory for each workshop. The strategy is to establish long-term perspectives for each regional network and for the entire network. Nevertheless, contribution is also given to the visibility of the network.

An instrument that is appropriate to assure long-term development structures and sustainable network activities in education, knowledge transfer, and research is the development of a concept for a regional "Competence Centres for Further Education". Here, knowledge from universities (academia) and expertise from companies and state agencies can be brought together. The concept will also include further education and training of water workers and engineers who are urgently needed in developing and least developing countries. Expressed in simple terms, this concept, which is to be coordinated by the regional network, is to bring university (academic) knowledge into practice. The concept is on the one hand to guarantee and enable the dialogue between academics and practitioners from industry, NGOs, and state agencies and on the other hand to create the material preconditions (laboratories, offices, etc.) for joint projects, experiments, ...etc., and education and training. The output at the end of the *SWINDON* project should be a feasible concept for a competence centre. It would be the task of each of the four regions to develop such a concept, which is adaptable to the needs of the respective region. The implementation of this concept is expected to take place during the post-*SWINDON* period. The funding required for the competence centre should be raised by the industry and the public sector.

Another sustainability aspect of the network can be achieved by the involvement and exchange of senior professors. In this respect, the *SWINDON* regional centres are asked to create a pool of senior professors who are able to contribute to higher education, knowledge transfer, and joint research initiatives.

IV.3 NETWORK AND ORGANISATIONAL STRUCTURE OF SWINDON

The intercontinental network (Figure 1), which has successfully been established during the SWM project, represents the core of the SWINDON project. The network will consist of four regional centres integrating full and associate members.

IV.3.1 MANAGEMENT AND ORGANISATIONAL STRUCTURE

The TU Braunschweig will act as contractor for the SWINDON project and is legally responsible for the contract. The Project Chairman takes over the overall responsibility of the grant and will be the final decision-making body concerning financial and scientific issues of the project. TUBS experts and academic teachers will be involved in the administration, monitoring, and evaluation of all project-related educational and research activities.

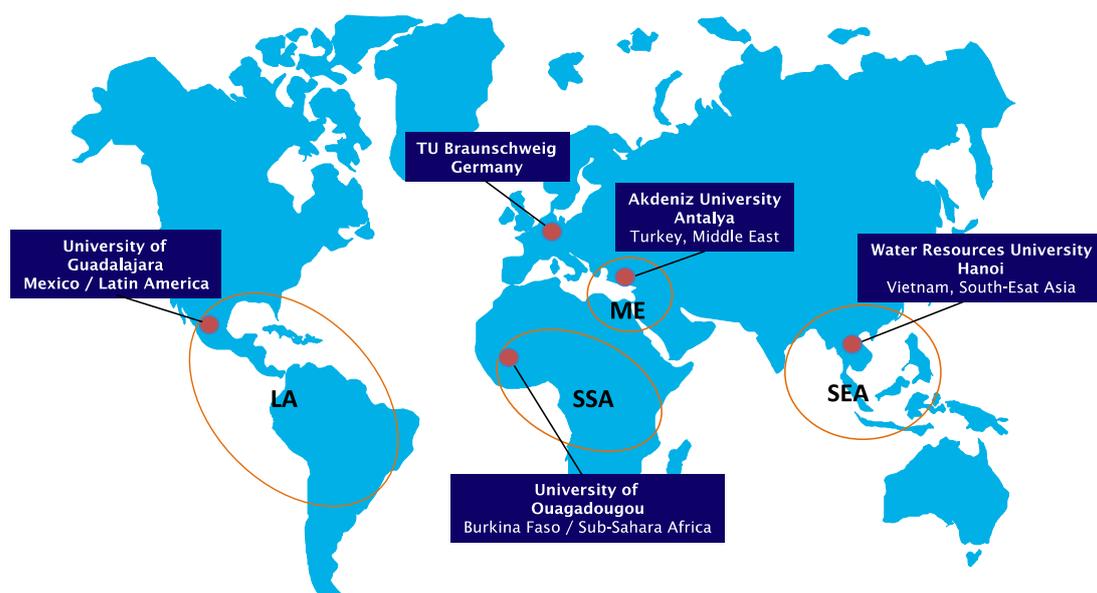
The regional coordinators RC will coordinate the project activities in their respective regions (for the regions see Figure 1). Each RC is responsible for the management and administration of its part of the project. The regional expert working groups and the academic representatives at every single regional member institution will be involved in all educational, research, and dissemination activities as well.

Prior to the writing of the proposal, all SWINDON network members were involved in within deliberations on how to save sustainable network structures and how to strengthen the role of the regional coordinator. It was agreed that the delegation of organisational and administrative tasks to the regional centre (regional coordinator) are to be part of the project management strategy of decentralised responsibilities. The output was a catalogue of tasks and respective responsibilities as they are listed below.

Catalogue of tasks and responsibilities:

1. The review of the students' reports (control of scientific content and self-dependent organisation and scheduling of reports) shall be carried out in cooperation with the supervisor of the sending institution. In case of student's application for a scholarship the RC will ask the supervisors of the sending and hosting institutions to review the research proposal of the candidate before he will send his complete applications documents to the SWINDON head office. Further, care must be taken to ensure that only grade "A" or "A/B" students are to be granted a scholarship.
2. Formulation of goals concerning the new project year and reports on the self-assessment of the reached goals; quarterly regional budget reports (see No 7 also) by the financial coordinator should be checked.
3. Statistics about student exchanges, teaching staff (incoming/outgoing), evaluation of the outcome of the workshops and summer schools.
4. Support and editing of the Curriculum Database related to respective region.

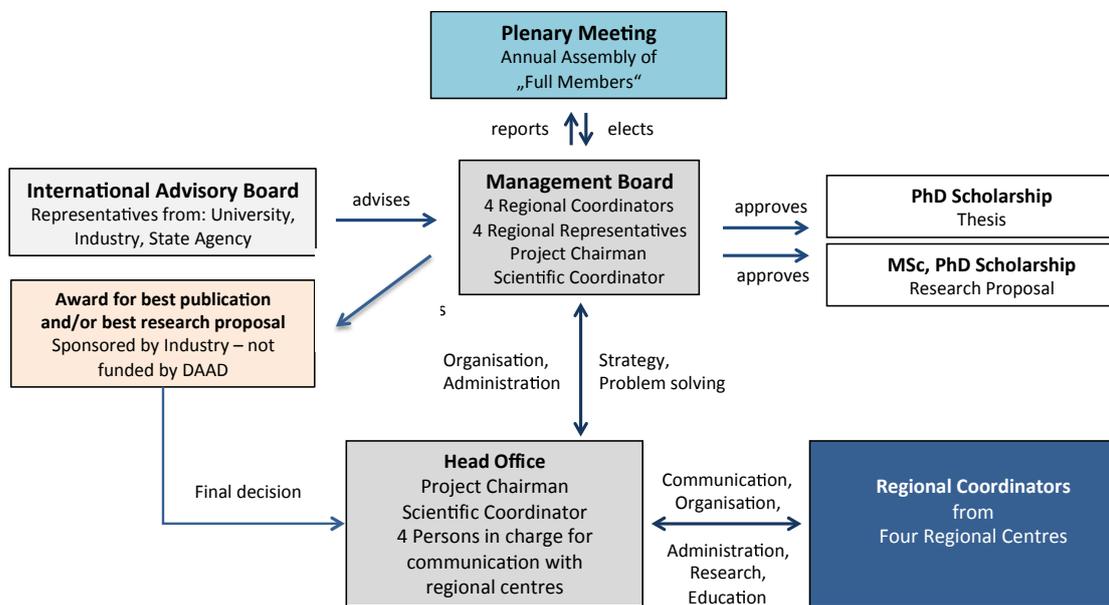
Figure 1: The global SWINDON network based on regional centres on four continents
(LA: Latin America, ME: Middle East, SSA: Sub-Sahara Africa, SEA: South East Asia)



5. Support and editing of the research information platform and the expert forum including information about potentials and research expertise of *SWINDON* project partner in the respective region.
6. Self-dependent allocation of the regional budget required for the regional activities (scholarship, regional meeting, workshop, summer school, teacher’s mobility, coordination trips, conference contribution/participation). Just as before, the Head Office will carry out all accountings as usual. However, the regional coordinators will regularly be provided with an updated balance for their region. This provides the opportunity for optimal use of the remaining money for *SWINDON* project activities within the region.
7. Concerning publications, the regional coordinator is asked to control publication activities and to encourage colleagues to submit papers dealing with the *SWINDON* research topics. The regional coordinator also takes care for the organization of two regional meetings per year. Ideally, the second meeting should be carried out during the last quarter of the year for scheduling the activities of the coming year. The last regional meeting in 2019 is dedicated to the creation of a detailed work plan that is about the measure and task for reorganising the post-*SWINDON* network.
8. In order to highlight the results and outcomes of the expert and regional workshops, the regional coordinators are asked to consider for the workshop planning the participation of stakeholders, decision makers, and representatives from local/regional media. The results and outcomes shall be presented the last day of the event under participation of the aforementioned groups. If, for example, representatives from media are not able to attend the workshop, the workshop organiser/s should issue a press release.

Furthermore, the regional coordinator monitors and assesses the activities of the *SWINDON* project members in his region and suggests changes concerning the status of “full” or “associated” membership. For example, a reason to change the status from full to associate membership is displayed in a situation when a full member hardly contributes to any activities. The regional coordinator reports to the Management Board that carries out the final examination and decision on the membership status in question. The monitoring procedure includes the data collection on regional measures in order to evaluate results / outcomes in comparable that includes the data from the regional centres as well.

Figure 2: *SWINDON* organisation chart



Each full member institution nominates a person as representative. The full member institution and its nominated representative are specified in the Letter of Intent (LoI). In case of full membership, the representative is automatically authorised to vote on the annual Plenary Meeting (Figure 2). The Plenary Meeting elects the members of the Management Board that consists of the four regional coordinators and four regional representatives (one from each region). The regional representative assists the regional coordinator, while being involved in all administrative and organisational issues within the respective region. Further members of the Management Board are the Project Chairman and the Scientific Coordinator. The Scientific Coordinator will be appointed by the Project Chairman and will subsequently be approved by the Steering Committee at TUBS. The Scientific Coordinator is responsible for the project management, scientific activities, for connecting with the *SWINDON* project members, the regional expert working groups, and other network organisations.

The Steering Committee is part of the *SWINDON* Head Office and consists of four persons who are responsible for the communication with the respective regional centre. Primarily, the communication focuses on organisational (planning of project measures and activities, execution of project dissemination activities, etc.), strategic, and/or scientific issues. Beyond that, the Steering Committee supports the Management Board in all matters.

Annually, the Management Board meets for coordination talks, which are primarily dedicated to general project management issues. The Management Board also takes decisions on overall strategic planning of activities, execution of projects, dissemination of joint research and project activities, development of strategies and instruments aiming at the sustainability of the entire network. These strategies and instruments must prove to be viable, sufficient, and stable before the *SWINDON* project will expire. The Management Board also approves applications for scholarships (student exchange) and reviews the proposals submitted. The selection process is mainly based on the scholar’s professional education, the ranking as “A” and “A/B” student, the scholar’s certification of English proficiency, the proposal that has clear reference to the research topics, and the recommendation and invitation letters provided by the responsible supervisors (sending/hosting institution). Further, the Management Board makes suggestions for awarding a prize for the best publication or joint research initiative. The prize is sponsored by industry and does not bear any relation to DAAD funding.

The International Advisory Board advises the Management Board on strategic issues and on the general development of the project. Members of the International Advisory Board are international leading experts from the academia and industry, e.g., German Water Partnership GWP, German Association for International Cooperation GIZ, DAAD, and International Funding Institutions from developing countries.

Figure 3: Organisation structure of regional *SWINDON* networks

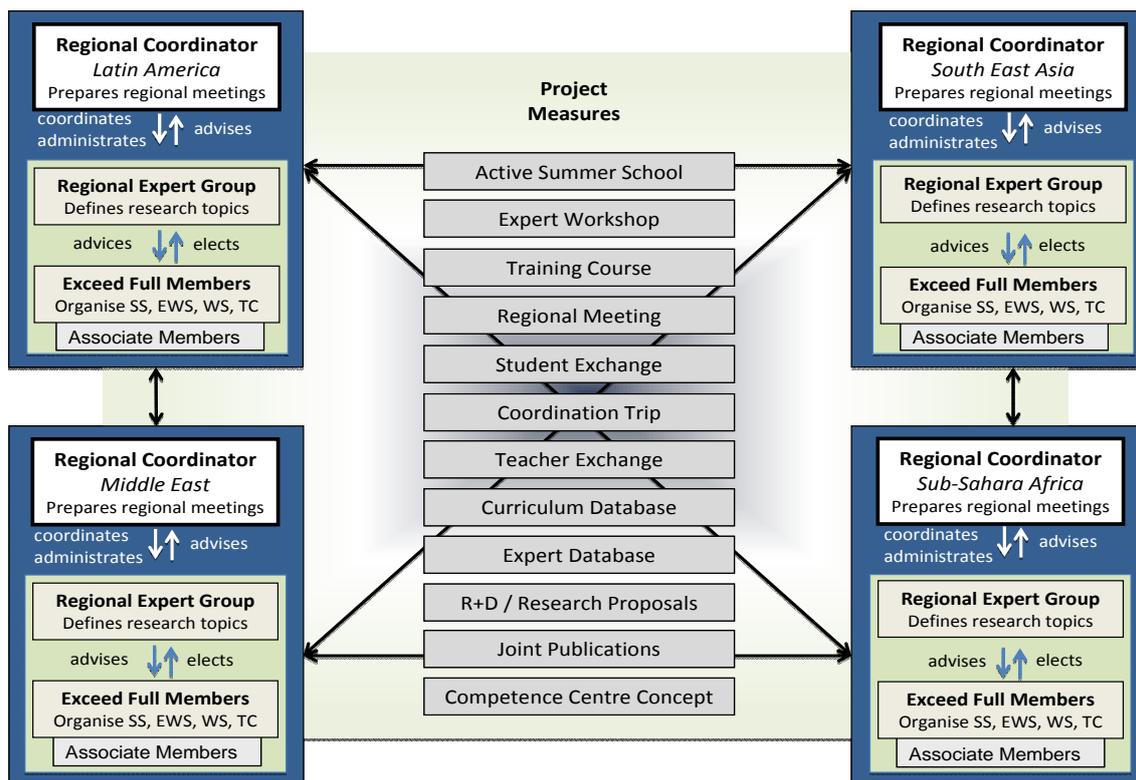


Figure 3 mirrors the decentralised organisation of the regional *SWINDON* networks. According to the advice of the evaluators of the previous *SWM* project, each of the four regional networks will be given more self-responsibility. The self-responsibility refers to the realisation of the project objectives and the organisation and administrative implementation of the project areas and measures mentioned in chapter IV.1. Together with the regional coordinator, who represents the regional centre, the expert working group sets the priority of the future thematic and content-related /specialist focus of the project measures. This mainly concerns summer schools, expert workshops, regional training courses, teacher exchanges, and student exchanges. It further concerns the development of the expert database and the initiatives for joint research proposals and joint publications. The regional expert working groups are, so to speak, the “regional management board”, which

manages and controls the activities and strategic orientation of the regional network with regard to higher education, joint research proposals, and publications. This also, in particular, includes the development of instruments and sustainable organisational structures, which ensure future regional network activities and the financial security and self-reliance after the *SWINDON* project has expired.

Under the leadership of the regional coordinator, the expert working group stays in close contact and meets regularly (twice a year) with the full members at the regional meeting. Before the beginning of the next project year, the regional meeting at the end of each project year is used to discuss the content-related / specialist focus of the project measures and fixes the number of student and teacher (staff) exchanges as well as the coordination trips. Furthermore, during the regional meeting, the full members discuss the anticipated outcomes of the project measures and of the entire project year. This does not merely include the counting of exchanges (students, staff, or coordination trip), but also, in particular, publications, and launched research initiatives in cooperation with members of other networks, *SWINDON* members, and stakeholders. The regional coordinator calculates the statistic values, which are taken as basis for the quality management of the regional network activities. The regional meeting also debates the status of full and associate membership and proposes revisions, if necessary.

V. STRATEGIC REGIONAL CENTRES AND REGIONAL NETWORK MEMBERS

Within each of the four regional networks (Latin America LA, Middle East ME, Sub-Sahara Africa SSA, and South-East Asia SEA) one coordinating enforcement body (strategic regional centre) acts as a “nucleus” with responsibility for ensuring the continued development and sustainability of its own regional network. The regional networks themselves will develop concepts and disseminate projects within sustainable water management embedded in their regional context and demand. By these activities, they are able to actively influence regional and nation-wide politics in water-related issues. In order to do so, they use the joint expertise of all *SWINDON* project members and actively collaborate with stakeholders in their respective region. Owing to their network and academic reputation, they will moreover establish contacts to industry, state agencies, and NGOs in order to exchange ideas for new research projects dealing with water. They will also contribute to the establishment of study courses and the implementation of measures for knowledge transfer to enterprises and political stakeholders.

All four regional *SWINDON* networks were selected based on the following criteria: water situation in the countries of the respective regional network, water supply, specific water problems, professional training opportunities, and expertise of the partners in water-related issues. Special attention has also been paid to the relevance of professional training opportunities in the respective countries. These criteria will further be valid for *SWINDON*.

V.1 THE “LA” REGIONAL NETWORK

The strategic regional centre, University of Guadalajara, is one of the most important research institutions in Mexico in the field of hydrometrology, sanitary environmental engineering, and sustainable water management. As regional centre of the LA regional network, the University of Guadalajara aims at elaborating a concept for sustainable water management in megacities. Like Mexico-City, Guadalajara is growing incessantly, which leads to drastic social and environmental consequences.

A common big problem not only in Mexico but also in all Latin America is the pollution and deterioration of water bodies (rivers, lakes coastal zones and even underground water) because of industrial, agricultural, and urban human activities. Therefore, the demand for clean water is straining the infrastructure and overtaxing supply capacities. The University of Guadalajara intends to provide the scientific expertise for the solution of this kind of water management problems. The activities in Mexico are supposed to set an example for regional politics and to be put into practice all over Latin America. The University of Guadalajara (UdeG, Mexico) closely cooperates with the following network members: (1) National Autonomous University of Mexico (UNAM, Mexico), (2) Pontifical Catholic University of Rio de Janeiro (PUC, Brazil), (3) University of Sao Paulo (USP, Brazil), (4) Federal University of Sao Carlos (UFSC, Brazil), (5) Federal University of Pernambuco (UFPE, Brazil), (6) Federal University of Santa Maria (UFSM, Brazil) and, (7) University of San Juan (UNSJ, Argentina). The study programmes offered are open to students from the smaller Middle American countries, where master and doctoral courses are not available.

V.1.1 SELF-CONCEPTION OF THE “LA” REGIONAL CENTRE AND NETWORK

The University of Guadalajara (UdeG) is the second biggest university in México and the most important one out of Mexico City considering several indicators like number of international publications in scientific journals,

number of Certified High Quality Postgraduate Programmes and number of professors belonging to the National Researchers Association of the National Council of Science and Technology. At the international level, the UdeG has more than 470 collaboration agreements with universities and institutes around the whole world and it is considered within the top 100 in rankings. These features give to the UdeG a high international mobility of students and professors and facilitate the academic cooperation throughout the entire world in several topics.

The UdeG is organised in several thematic centres. One of them, the University Centre of Exact Sciences and Technologies (CUCEI), is the leader in number of scientific publications and is recognised as one the most important research institutions in water related topics like sanitary and wastewater treatment engineering as well as in hydrometeorology and oceanography. In addition, it is important to mention that recently, CUCEI has celebrated an agreement with the Inter-municipal Council of Sewer and Drinking Water, in which several CUCEI-Departments will be involved in order to face several problems related with the subject of water in Guadalajara. In this sense, the UdeG aims to develop a concept for sustainable water management in megacities including the study of the social aspects.

Latin America faces large problems related to sustainable water management. Very common in most of the LA countries is the pollution and deterioration of water bodies. Thus, the regional network aims to contribute to the solution of this kind of problems through the start-up and development of joint research projects and the exchange of academic staff and students for research stays and lectures. The UdeG will act as coordinator of these activities, promoting the collaboration and cooperation between partners. Furthermore, some of this kind of problems is affecting also other regions in the world like Sub-Sahara Africa and some countries in Asia. In this regard, the UdeG will serve also as link for coordinating South-South research and other joint academic activities. The regional centre will also take over the responsibility for the administrative and organisational issues of the regional network activities. It further refers to the main objectives of the *SWINDON* project and ensures the quality standard of all project measures with respect to the scientific and technical content and outcome remains on a consistently high level.

The excellent relationship between partners and the large experience gained during the *five years of SWM* in south-south exchanges ensure the achievement of these objectives in the close and medium future, either with the funding of the *SWINDON* project or by searching other international funding sources. Of course, UdeG as regional coordinator willingly takes and accepts this commitment.

V.2 THE “ME” REGIONAL NETWORK

As the desertification grows worse, dwindling harvests, an irreversible degradation of the soil, and changes of the socio-economic structures go hand in hand. Against this background, the processing and reuse of wastewater in arid and semi-arid regions imposes itself as a pivotal topic of the region.

In order to be able to cope with this problem sub-research groups were established: The first research group is Urban Water Management that includes Water Loss Management in Water Supply Systems that has close ties to water quality in the distribution systems. The second group is the Water Demand Management. Especially, agricultural water demand, which is the most water-consuming sector in the whole region, should be managed in a more sustainable way. Water Footprint Methodology can be used as a decision support tool for this issue. The third group is the Water Quality and Health plus the Reuse of Wastewater that is also a crucial issue for the region. The Prince Faisal Dead Sea Research Centre for Environment and Energy at the Mutah University, as well as the new regional centre, the Akdeniz University in Antalya (Turkey), closely cooperate with the project partners and the water-related state authorities in Jordan, Egypt, and Turkey. Together they develop concepts for solving the water issue, which repeatedly led to conflicts in this region in the past.

Furthermore, emphasis should be laid on the implementation water projects into the socio-cultural structures, and to launch an intercultural dialogue.

V.2.1 SELF-CONCEPTION OF THE “ME” REGIONAL CENTRE AND NETWORK

Akdeniz University is the biggest university at the Mediterranean Coastal Zone of Turkey with 45.000 students and more than 1.500 academic staff. Research on waste water management, biotechnological applications and emerging pollutants, water loss management in water supply systems and application of water footprint methodology on water demand management studies as well as Life Cycle Assessment as decision support tool for environmental decisions are the main activities of AU-ENVE. Union of Municipalities, state water agencies, Ministry of Forestry and Water Issues and Ministry of Environment and Urbanization are the main partners of the department.

The ME network managed by Akdeniz University includes partners from Turkey (Konya NE University, TÜBITAK, and Yildiz Technical University), Egypt (Ain Shams University, Mansoura University, National Centre for Research, and University of Jordan). The network aims at bringing together scientists, researchers, authorities, funding agencies, industry, and students to look for solutions of water and environmental issues in the ME region. The regional centre will coordinate and contribute to sustainable networking between *SWINDON* members and different stakeholders related to sustainable water management. It will also stimulate and promote joint research projects and the exchange of academic staff and students for research stays, capacity building through training and lectures.

The regional centre will further take over the responsibility for the administrative and organisational issues of the regional network activities. It focuses on the main objectives of the *SWINDON* project and makes sure that the quality standard of all measures with respect to the scientific and technical content and outcome remains on a consistently high level.

V.3 THE “SEA” REGIONAL NETWORK

The Water Resources University (WRU) in Hanoi was established in 1959 and has become the leading institution in Vietnam for the management and protection of water resources. Increasing water pollution, extreme flooding, and extreme low water levels characterize the water situation in Vietnam. The WRU as strategic centre particularly focuses on the subject matter of industrial wastewater, whose accumulation is increasingly becoming a problem in newly industrializing developing countries. The processing of wastewater bears fundamental significance in providing the Vietnamese population with drinking water and maintaining their health. Further, the WRU focuses on flood and low water management, and thus on the integrated resources management regarding water quantity and water quality. WRU also aims at developing concepts for the treatment of industrial wastewater and the implementation of a management system for water protection, making a significant contribution to reducing the number of infectious diseases and drastically cutting the infant mortality rate. The centre will closely collaborate with the Vietnam National University in Ho Chi Minh City, the Tongji University in Shanghai (China), the Institute Pertanian Bogor, and the Gadjah Mada University in Yogyakarta (both Indonesia), since those countries are in need of an integrated water management system. In cooperation with the Asian Institute of Technology in Bangkok, postgraduate study programs will be offered for the entire Asian region.

V.3.1 SELF-CONCEPTION OF THE “SEA” REGIONAL CENTRE AND NETWORK

As leading university in Vietnam since 55 years, the Water Resources University has provided the country with hundreds of thousands of cadres and personnel in multiple disciplines ranging from engineering, technology, and economics to teacher training. The WRU is now gearing towards training a contingent of qualified and high quality human resources with leadership skills, strategic vision, sharp thinking, and sound adaptability to the world of work in the age of integration. Hence, the quality of training and research is always the number-one priority in all guidelines and policies of WRU. The WRU as strategic regional centre will make use of its expertise and acts as a nucleus with responsibility for ensuring the continued development and sustainability of its own regional network.

Within the frame of the *SWINDON* project for student and faculty exchanges WRU will promote professional development, curriculum renovations, and pedagogical change. Many interdisciplinary cooperation projects were and are focussed on water management, flood, and drought control and social, political aspects in water issues. In that regard WRU will be the driving force that initiates the strategic guidance and steering for both short and long-term measures of the *SWINDON* project work to achieve its objectives.

The WRU is dealing intensively with the major problems that are related to Sustainable Water Management. As strategic regional centre WRU deals this problems with other partners in Asia jointly and brings in its expertise and respective experiences in teaching, doctoral training, and research.

The WRU is willing to contribute to the stability and sustainability of the regional *SWINDON* network, to strengthen the relationship between the network members, to promote south-south exchange activities, and to act as driver for joint research proposals and funding sources after *SWINDON* has expired. The regional centre will take over the responsibility for the administrative and organisational issues of the regional network activities. It focuses on the main objectives of the *SWINDON* project and makes sure that the quality standard of all project measures with respect to the scientific and technical content and outcome remains on a consistently high level.

V.4 THE “SSA” REGIONAL NETWORK

Founded in 1974 by the Government of Burkina Faso, the University of Ouagadougou (UO) is a public university who plays a key role in economics, education, and cultural development in the country. The UO is the first university of the country and one of the most important researches institutions in the field of Hydrology, Environmental Pollution Control, and Sustainable Water Management.

As strategic member of the Sub Sahara Africa (SSA) regional network, the UO, throughout its training and research units in applied and exact sciences, aims to develop Water Pollution Risk Assessment in Transboundary Rivers Basins, with the involvement of stakeholders who are active in resource management mainly in rural area. The stakeholder's are national government representatives, locale associations of youth, women, and men, the chiefs of villages as well as NGOs and researchers working for better management of water resources.

Water pollution is a major problem in most African countries. This is caused by many factors such as improper handling of pesticides and fertilisers, inadequate treatment of wastewater from homes and industries. This kind of pollution is a key issue in the development of conflicts between countries sharing rivers. The UO aims to develop strategic approaches for the involvement of stakeholders in Water Resources Management on African level, and to provide qualified human resources and scientific data for supporting decision-making processes of national governments. In order to work on Sustainable Water Management located in the areas of capacity building/higher education, knowledge transfer, networking, and research, the SSA network will combine its strengths by participation of the following Universities: Bahir Dar and Mekelle (Ethiopia), Kara and Lomé (Togo), University of Malawi, and Maseno University (Kenya). Associate membership is proposed for the Management and Computer Science High Institute (ISIG, Burkina Faso) and the University of Botswana. All these Universities have well-qualified and experienced researchers who have broadly based contacts to state and governmental agencies dealing with water, health, and environmental issues.

V.4.1 SELF-CONCEPTION OF THE “SSA” REGIONAL CENTRE AND NETWORK

The University of Ouagadougou (UO) has currently more than 253 collaboration agreements with other universities, industrial partners, and funding agencies worldwide. These collaborations ensure mobility of students and staff on very high levels. Currently, 85 internationals research projects with other universities, research centres, NGOs, ... are carried out.

The UO consist of several Training and Research Units and Institutes that offer higher education not only on theoretical, but also on practical level. Each of the Training Research Units combines the advantages of fundamental teaching on faculty level with those of professionalisation on institution level.

Many researchers from UO together with external experts and stakeholders have participated in previous interdisciplinary research cooperation dealing with natural resources management, assessment of water pollution risk, and water management. Here, the Volta basin and rural areas were in the focus of interest. The stakeholders, who participated in this cooperation, came from governmental institutions and local associations.

The Training and Research Units in Applied and Exact Sciences coordinate the *SWINDON* project at the UO, but other expertise and faculties of the University of Ouagadougou are also involved. The University takes over the role of the Regional Centre of the SSA regional *SWINDON* network, supports and coordinates the network activities for development and cooperation in the field of Sustainable Water Management. Together with the SSA expert working group the regional centre will focus on specific scientific topics dealing with local water problems and carefully places thematic emphasis on project events like summer schools, expert workshops, ... etc. The Regional Centre takes the role as policy maker and is responsible for the strategic orientation of the regional network even if the *SWINDON* project has expired.

The regional centre ensures that information and experiences will regularly be distributed and equally shared among its network members. The regional centre will take over the responsibility for the administrative and organisational issues of the regional network activities. In case of tackling specific problems and searching for specific solutions, others Universities and Institutions on regional level should be given the opportunity to join the regional network as associate members. The UO aims to take advantage of the mobility offered by the *SWINDON* project, to develop joint research proposals for funding with University and non-University partners on Sub-Sahara African level. The regional centre focuses on the main objectives of the *SWINDON* project and makes sure that the quality standard of all project measures with respect to the scientific and technical content and outcome remains on a consistently high level.

VI. COOPERATION WITH OTHER NETWORKS

ex)(cœed Centres in Germany

The SWINDON project will establish close connections and set up thematic and content-related links to the other ex)(cœed centres in Germany. The task will be to concentrate expertise and knowledge with the aim of joint network activities within thematic research clusters that focus on the post-2015 agenda and the topics mentioned in goal 6.

German Water Partnership (GWP)

The German Water Partnership is a platform of coordinating agents in the field of water in Germany, which was founded in 2007 on the initiative of the former TUBS Vice-President, Professor Bahadir. GWP today consists of 350 public and private partners in Germany, i.e. corporate enterprises, governmental and non-governmental organizations, scientific institutions, and expert associations in the area of water. They aim at bundling activities and initiatives of the German water economy, and at the worldwide provision of expertise. The SWINDON project at TUBS will continue contributing to GWP working groups and making the results available to all regional centres as well as to all members in developing countries. This increases the expertise available at, and the range of activities and services offered by, the entire SWINDON network, which can then be employed in development cooperation in a much more purposeful and strategic way.

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

German Association for International Cooperation

GIZ operates in many fields: economic development and employment promotion; governance and democracy; security, reconstruction, peace building and civil conflict transformation; food security, health and basic education; and environmental protection, resource conservation and climate change mitigation. GIZ supports partners with management and logistical services, acts as an intermediary, balancing diverse interests in sensitive contexts, and, in crises, carries out refugee and emergency aid programmes. As part of its services, the association also second development advisors to partner countries.

Through programmes for integrated and returning experts, GIZ places managers and specialist personnel in key positions in partner countries. Networking and dialogue among actors in international cooperation is strongly promoted. Capacity development for partner-country experts is further a major component of the services, whereby the programme participants are offered diverse opportunities to benefit from the contacts they have made.

The SWINDON project at TU Braunschweig makes use of these programmes and contributes to building links to the GIZ networks for establishing promising contacts to industry, state agencies, and politicians in Germany and SWINDON networks in developing countries.

Knoten Weimar

The »Knoten Weimar« is an international transfer hub for environmental technologies. This initiative offers services in the fields of technology transfer, as well as further education and training. The »Knoten Weimar« brings together the matching partners in transfer and educational projects, and arranges business contacts. The SWINDON project will further make use of the established cooperation with the »Knoten Weimar« in development cooperation projects, while at the same time utilizing the »Knoten Weimar« to promote the project activities to a broader expert audience.

Mediterranean Scientific Association of Environmental Protection (MESAEP)

The Mediterranean Scientific Association of Environmental Protection (MESAEP) was founded in October 1979 in Munich, Federal Republic of Germany as a non-profit scientific organization registered at the District Court in Munich. The Association Members, hailing from Mediterranean and other countries, are scientists engaged in research and development in the field of environmental technology and chemistry as well as ecotoxicology.

The objective of the MESAEP is to provide a forum for interested persons who do not solely work in the field of environmental sciences but also in the field of economics and politics. For this purpose, the Association shall consider all the problems concerning the protection of life in the region from harmful effects of chemical and physical agents, both natural and man-made. The regulatory bodies in the Mediterranean regions will be encouraged and advised by the recommendation of MESAEP to make proper decisions for an improvement of the environmental quality and safety.

Activities of MESAEP also centre on stimulating the joint research projects between North and South. Special EU funds for enhancing cooperation with the Mediterranean Countries are considered to be helpful for the realization of these projects. This currently concerns the multilateral cross-border cooperation

"*Mediterranean Sea Basin Programme*" which is part of the new European Neighbourhood Policy. It includes the European Union and partner countries regions placed along the shores of the Mediterranean Sea.

Within the framework of the previous *SWM* project activities the close contacts to MESAEP were used to strengthen the ME network and to launch project cooperation. With regard to the *SWINDON* project, the existing contacts will further be strengthened and expanded. The present regional coordinator for ME was recently elected president for the MESAEP Association will take over this task and will contribute to establish strategic cooperation partnerships with MESAEP members.

German Alumni Water Network (GAWN)

The German Alumni Water Network (GAWN) has been established to better coordinate the activities of former students from German universities and development associations in Germany. Through its database, it provides contact information online for alumni in the water sector, including information about further education opportunities, i.e. expert seminars. Within the run of the *SWINDON* project, GAWN will be utilised to facilitate academic exchange for students, lecturers, and experts. *SWINDON* will also make use of this network in order to provide a broad bundle of opportunities to exchange experiences and ideas.

VII. PROJECT FINANCES

The total budget of the *SWINDON* project amounts to 850.000 € per year. In order to conduct the entire project coordination properly, particular consideration is given to staff, activities, and measures allocated to the project areas below. Here, the reviewers' recommendations of the mid-term evaluation of *SWM* are incorporated.

Project areas:

Administration - To ensure the processing of the numerous and complex administrative tasks, which are related to the *SWINDON* project, a stable and sufficient funding and staffing of the Head Office staff is required. During the run of the *SWM* project lessons were learned from the project administration that was significantly impaired by often changes of project staff and insufficient financial resources. Against this background, positions are being asked for the project and scientific management (100 %), the financial coordination (100 %), and the coordination of student and staff exchanges (50 %). Further, to remunerate the regional coordinators for time and effort and to support their position as head of the regional network, a monthly salary shall be paid. The regional coordinators are seen equivalent to German professors. The equivalency refers to comparable position-related workloads in administration, teaching, and research. Against this background, the regional coordinators will be paid proportionally.

Related to the overall budget, the financial resources, which are necessary for the project staff and regional coordinators, amount to 24 %. This ratio appropriately reflects the urgent demand.

Capacity Building / Higher Education - Special emphasis is laid on the student and teacher exchange in south-south direction to support capacity building in developing countries. In addition, financial priority is given to further development of the curriculum database.

Network / Knowledge Transfer / Research - To strengthen the ties of the entire *SWINDON* network, priority is given to further development of the project website with active links to the respective regional networks and member institutions. Here, the approach of an expert database is to contribute further to the latter and to support the scientific communication between experts. With respect to knowledge transfer and research initiatives, representatives from state agencies or NGOs will be given support to participate in expert workshops. Further, full members will be given the opportunity to undertake coordination trips. In order to provide incentives for research initiatives, every year the two best research proposals, which have to be submitted to the Management Board for evaluation and approval, will be financially supported. Here, financial support is given to scientific staff, equipment, travel, and accommodation.

The purchase of small instruments serves to improve laboratory capacities needed for proper working conditions for incoming students and to support respective training courses.

VIII. CAUSAL STRUCTURE ON INPUT, OUTPUT, AND OUTCOME

In general, the follow-up proposal about the *SWINDON* project sustainably underpins that what has already been achieved during the project period of *SWM* and sets itself the task of further strengthening the higher education member institutions' contribution to sustainable development, and sustainable water management in particular. The targeted consolidation of the hitherto existing networks goes hand in hand with a focussing process that includes raising their profile and expertise within the meaning of the post-2015 agenda in general,

and the goal 6 implemented in particular. In order to achieve this, the higher education member institutions within the new SWINDON network are required to develop concepts and strategies for networking, capacity building/higher education, knowledge transfer, and research. This also includes the organisational and financial sustainability of the networks, the reinforcement of south-south collaboration and, jointly with the network members, the implementation of defined procedures and processes for the network activities. With regard to the network activities, the input, output, and outcome levels are based on the project-specific activities and measures. Hence, the contents and indicators on these levels are individually defined and adapted to the structure and focal points of the project proposal. The individual levels of input, output, and outcome are presented in Table 5 and are assigned to the project areas and respective activities and measures.

The output level includes developments, technical, institutional abilities that have been created, personal skills or knowledge that has been imparted and results from the use of resources and the implementation of activities. The outcome level includes direct (short and medium term) positive and negative effects which are both intended and unintended and which result for the target group from the use of the outputs. Furthermore, the outcomes in Table 5 comprise that the members involved in the SWINDON network have elaborated strategies for the organisational and financial sustainability of the regional and entire networks, that they have realised joint research project related to the post-2015 agenda and have qualified students and young scientists in studies related to sustainable water management.

Table 5: Measures, Goals, and indicators for success on input, output, and outcome levels

Input project areas (activities, measures)	Member institutions at TUBS	Regional Centres and member institutions	Output (Goals anticipated)	Outcome / Indicators for Success (qualitative, quantitative)
Network (Chap. IV.2.1)				
Implementation of full and associate membership		X	Network consolidation and strengthening	Number and performance of <i>full</i> and <i>associate</i> members
Further increase of network visibility	X	X	Obligatory participation of media and representatives from industry, state agencies or NGOs in all activities	Number and quality of activities with the attendance of representatives from the institutions mentioned left
Further improvement of the main website and better link to and among the members of the entire network	X	X	Each region implements a sub-website that should provide information to regional members and to the public	Functioning sub-websites in all regions and completion within the first year of the project
Networking, Sustainability	X	X	Cooperation activities between full and associated members	Type, quality and number of cooperation activities and research initiatives with members from universities, companies and/or state agencies
			Concepts for assuring the operational and the financial sustainability of the regional and overall network	Type and number of activities of full members; sustainable concepts
SWINDON topic and political agenda	X	X	Concepts and strategies to effectively incorporate local authorities' and politicians' participation into project activities; portfolio of competences	Number of local authorities and politicians; sensibilisation of these groups; concrete interest in the portfolio of competencies

Table 5: continued

Activities, Measures	Member institutions at TUBS	Regional Centres and member institutions	Goal	Outcome / Indicators for Success (qualitative, quantitative)
Capacity building / Higher Education (Chap. IV.2.2)				
Exchange of students (PhD, MSc)	X	X	Qualification of students through international experiences	Number of students; capacity building
Exchange of experts and teaching staff	X	X	Building cooperations and capacity building in developing countries	Number of exchanges and cooperation agreements
Active summer schools	X	X	Qualification of participants in terms of the subject matter of DC	Number of active summer schools and participants; capacity building
Further development of curriculum database		X	Middle East regional centre takes over future maintenance and updating of the CDB	CDB helps students to specifically search for courses appropriate for their graduate education; CDB serves as a source for structuring and developing master curricula on SWM in developing countries

Table 5: continued

Activities, Measures	Member institutions at TUBS	Regional Centres and member institutions	Goal	Outcome / Indicators for Success (qualitative, quantitative)
Research (Chap. IV.2.3)				
Joint research proposal	X	X	Completion of joint research proposals	Number of successful project fundraisings
Joint publication	X	X	Joint publications: regional members; members from different regions	Number of publications, special issues
Expert working groups	X	X	Establishment of the groups, allocation of tasks	Expert working groups work on specific research topics and practice-oriented solutions of regional water-related problems
Thematic (trans-regional) research clusters	X	X	Building trans-regional thematic and interdisciplinary research clusters	Enhancement of trans-regional joint research cooperation; Strengthening of the operational sustainability of the network.

Table 5: continued

Activities, Measures	Member institutions at TUBS	Regional Centres and member institutions	Goal	Outcome / Indicators for Success (qualitative, quantitative)
Knowledge Transfer (Chap. III.2.4)				
Training courses		X	Scientific exchange and exchange of practice-oriented knowledge and skills training	Number of participants; built capacities
Expert workshops		X	Scientific exchange between developing countries; solution of water problems in developing countries	Number of participants; proposals for practical solutions; agreements on joint cooperation and research
Competence centres for further education and knowledge transfer		X	Development of concepts	Feasible concept(s) at the end of <i>SWINDON</i> ; bringing university knowledge into practice; further education and training of water workers and engineers

Within each regional network, it is the regional coordinator’s responsibility to ensure the quality management of the activities and measures, the output anticipated, and the qualitative and quantitative outcome of the activities and measures. While fulfilling this task, he receives essential support from the expert working group. Substantial support from the expert working group and all full members is further expected with regard to concepts and structures that are suited to ensure the stability and the operational sustainability of the regional and of the entire *SWINDON* network, finally.

The quality management of the *SWINDON* project mainly aims at ensuring consistently high quality of the project activities and measures. Here, the monitoring of project activities and the feedback from participants (summer schools, expert workshops, regional workshop, training courses, and teacher and expert exchanges) and supported graduate students serves as basis for continual improvement. For assessing the quality of the project activities and for receiving useful suggestions for the improvement of the *SWINDON* activities each participant will be asked to give his comments via the new forum on the main website. For this purpose, a questionnaire has been developed and will be available on the website.

VIX. GENDER POLICY

The *SWINDON* project, within the frame of its entire network activities, commits itself to follow the principles of gender equality. Here, gender equality is understood as equal visibility, empowerment, responsibility, and participation for both women and men.

Over the past 30 years, the United Nations General Assembly and UN Economic and Social Commission (ECOSOC) have emphasized issues related to inequalities, insufficiencies, and disparities in the access of women to education, training, and the labour market. Further, the UN stated that a key priority to address successfully gender issues is to fill the gaps between (i) field level staff (and their experiences) and higher-level water professionals and policy-makers; (ii) gender experts and other water specialists.

To date various major international initiatives on the subject have been undertaken and special attention has been directed towards the role of women in science and technology. Gender equality is one of the eight United Nations Millennium Development Goals, which clearly calls for action related to science, technology, and gender.

There can be no doubt that women represent one-half of the human intellectual resource, but is used to very small amounts. This issue is relevant for developed and largely for developing countries. In this context, many strategic instruments, such as networks of female scientists, female mentoring, or the use of role models in the promotion of women in science are thinkable. Further, according to cultural and social aspects, women’s traditional competence and practical knowledge in water management could be part of further education though focus should be on transfer of scientific knowledge into practical application.

Within its capacity, the *SWINDON* project addresses gender issues in that it strongly urges its members to comply with their obligation to implement these issues into their planning. The *SWINDON* project will

consistently promote activities and measures that particularly pay attention to gender equality. Here, the regional networks are asked to focus primarily on the integration of female scientists and female graduate students. What may happen in practice is that with respect to its annual planning of activities and measures, each regional network aims to appeal specifically to female graduate students and scientists with its offer to participate actively in the aforementioned activities. Here, for example, the responsible regional centres are strongly advised to integrate female scientists into decision-making processes during the regional meetings.

It has to be mentioned that the previous SWM project half of the number of the regional coordinators are female professors who should take over the task to implement special measures that support female scientists within the respective region.

X. REFERENCE TO MID-TERM EVALUATION AND IMPLEMENTATION INTO SWINDON

In Table 6 an overview of the reviewer’s recommendation with respect to the SWM mid-term evaluation is provided. The recommendations are followed by the consideration and implementation into the SWINDON follow-up proposal while a reference is given within the text.

Table 6: Reference to mid-term evaluation of SWM

Recommendations of the evaluation of SWM	Implementation in SWINDON
Organisation	
To identify a successor for the project’s chairman after his retirement	<i>The process of identifying the successor for the project’s chairman has been accomplished: Prof. Norbert Dichtl replaces Prof. Müfit Bahadır</i>
To restructure the assignment of administrative tasks	<i>More administrative and organisational task will be assigned to the regional coordinators and the regional expert working groups</i>
To integrate the SWM project in the TUBS	<i>The Department of Architecture, Civil Engineering, and Environmental Sciences has taken over the initiative to develop a concept, which is in coherence with the new strategic orientation of the TU Braunschweig. The concept will not only refer to research but also to education. In this context, the SWINDON project will play to the role of an internationally acting network, which can strategically be integrated whereupon all partners involved will gain mutual benefit through development cooperation, research initiatives, and knowledge transfer.</i>
To promote regional competence and the visibility of institutions in teaching and research	<i>“Capacity building through training” is proposed. It should last 2-5 days to 2-3 weeks. The members will send through their regional coordinators info on topics on which they will offer training and “planning of exchange opportunities for capacity building in the region” to be announced in the newly constructed regional website of the region.</i>
The continuation of the stakeholder-oriented process needs a long-term perspective	<i>Academics, municipalities, local authorities and in general decision makers will be addressed as stakeholders of the SWINDON project. The regional networks by their expert working group will identify the stakeholders in their regions and inform the regional coordinator with the relevant data.</i>
Stronger partners are able to take over some of the activities (technical support, Database)	<i>Akdeniz University is willing to undertake the development and management of the curriculum database on behalf of the SWINDON network in future.</i>
Regional centres support their own visibility through adequate internet presentations	<i>Each regional network creates a sub-website integrated into the “main” website that shall be updated by the regional coordinator. Furthermore, each member institution creates a link to the respective websites.</i>
To review and evaluate the project activities internally; evaluation of the outcome according to the project objectives in general and according to the outcome of every single measure in particular (strengthening the administrative and coordinating role of the regional centre (regional coordinator))	<i>The regional coordinator is responsible for the quality management and additionally receives essential support from the expert working group. According to quality management aspects of the project activities, an assessment of the input and the outcome of each activity are carried out. Each participant will be asked to give his comments via the new website forum on the main website.</i>

Table 6: continued

Recommendations of the evaluation of SWM	Implementation in SWINDON
Network	
To limit the size of its network partners	<i>Introduction of full and associate member status: Each member should show an interest to participate in SWINDON by a letter of interest accompanied with criteria; based on these criteria the partner can be evaluated as full or associate partner.</i>
To consolidate and strengthen the network activities through regional partner and regional centres	<i>The consolidation of the partners will take place as proposed above. The strengthening of the network activities will be easier in case the regions will have their own websites and the activities and the opportunities will be more visible.</i>
To establish clear regulations and guidelines to ensure participation by all partners	<i>A list of criteria and indicators to evaluate the activity of project members has been elaborated. The evaluation process of becoming or losing full membership is expected to stimulate competition among network members.</i>
Strengthening of network activities	<i>Full members will have the task to contact stakeholders; to organise co-financing and to initiate practice-oriented research projects.</i>
Measures / Knowledge Transfer / Higher Education	
To establish an electronic forum as a follow-up measure of summer schools or other events	<i>Following the establishment of the own website, a blog (alumni area) will be organized. After each activity, a detailed report will be posted in the web site and will be open for all kind of discussions/critics/feedbacks.</i>
To review the allocation of funds for mobility measures towards dedicated work on joint proposal applications in order to acquire urgently needed funding	<i>Joint research proposals will replace the instrument of the guest chair professor and guest chair team</i>
To offer long-term scholarships; to promote the allocation of scholarships for South- South exchanges	<i>It is proposed to allocate the funds for long-term and short-term (of course, subsequent assignments on the same positions) scholarships. By increased visibility of the network members, it is assumed that the number of south-south exchanges will also increase.</i>
Regarding the rather unsatisfactory amount of South-South-exchanges, particularly trans-continental exchanges, the installation of a marketplace for offers ("research inventory lists") in the password protected member area of the project's website	<i>The working topics and areas of interest taken up by the member institutions of the SWINDON project will be announced in the web site of the each region as short abstracts. The interested participants can take contact with the relevant academician.</i>
More efficiency should be aspired regarding to knowledge transfer and education	<i>Systematic and strategic (content-related and thematic) preliminary planning of measures ("active" summer schools, expert workshops etc.); the thematic orientation results from the specific regional problems related to water and from the decision-making of the regional expert working group.</i>
Knowledge transfer and education according to the regional requirements (strategic orientation and structural development)	<i>Introduction of new strategic instruments that enable knowledge transfer, education, and training opportunities. The instrument is appropriate to assure long-term development structures and sustainable network activities in education, knowledge transfer, and research is the development of regional "Competence Centres Concept for Further Education (CoCCo)". Here, knowledge from universities (academia) and expertise from companies and state agencies can be brought together.</i>
To support institutions in DCs by appointing senior professors from countries in the North for an extended period	<i>Former SWM partners responded positively to this recommendation. A list of universities and their disciplines will be prepared. The SWINDON project will create a pool of senior professors willing to support teaching and joint research activities</i>

Table 6: continued

Recommendations of the evaluation of SWM	Implementation in SWINDON
Research	
To develop interdisciplinary research clusters or programs, which focus strategically on development problems	<i>Each regional network is expected to work out its main regional related topics, but overlapping topics should also be defined (e.g. to be in the focus for joint research proposals). Expert working groups will be established to take over the responsibility to strategically focus on research and teaching topics within the respective region.</i>
Strengthening of the network with regard to joint research activities and publications	<i>Incentives shall initiate and provide start-up financing for joint project initiatives and paper preparations (bilateral, trilateral, and across the regions); awarding a prize for the best joint research proposal will provide additional incentives.</i>
To increase the overall visibility of the scientific community and an intensification of publication efforts	<i>Establishing the joint research proposals will contribute positively to the number of publications; obligatory invitation of media to SWINDON events is compulsory in order to increase the visibility.</i>
Resources / Funding	
To review possibilities to compensate for inadequate research infrastructure and facilities through sharing among universities in the large network	<i>Sharing the facilities among the member institutions is already applied. In addition, through sharing the info via the planned website, it will be easier for the interested researchers to be informed about the research infrastructure of the members</i>
Further funding (beyond 2015) under the condition that the regional centres and network partners should be empowered through further decentralization and funding has to be increased significantly.	<i>Establishing regional funding strategies by involvement of stakeholders; Participation of stakeholders in network activities and link to other networks (e.g. GAWN, GI, GWP etc.)</i>

XI. CAUSAL STRUCTURE ON NETWORK OPERATIONAL AND FINANCIAL SUSTAINABILITY AFTER SWINDON

One of the overall project objectives concerns the development of concepts and strategies for the operational and financial sustainability of the networks after the end of the SWINDON project. The following measures will be brought to the project activities and serve as input for the development of viable concepts that work to reach operational and financial sustainability of the post-SWINDON networks. While the created concepts belong to the output level, the development of strategies and final decision-making on which of the concepts best fits into the strategic orientation of each of the regional networks belongs to the outcome level. An additional output is referred to as a concept that meets the development of strategies required for the entire (trans-regional) network on outcome level.

On the input level, experts within the International Advisory and Project Management Board elaborate concepts related to organisational and financial sustainability of the regional and entire networks. This also includes the definition of measures to implement consequently post-2015 agenda topics defined in goal 6 into research initiatives and higher education. To broaden the project expertise and to form a critical mass, a pool qualified persons (senior professors, experts from industry ...etc.) will be set up:

- Pool of qualified persons (experts, senior professors) will be set up (operational concern)
- Pool of project sponsors will be set up; e.g. from industry or NGOs (financial concern; the sponsoring is subject to the post-SWINDON period)
- Approach for a Competence Centre Concept (CoCCo) for further education (operational and financial concern) will be developed
- Approach for a biannual Symposium on Sustainable Water Management Issues with special focus on transfer of theoretical (academic) knowledge into practical solutions (operational and financial concern)
- Establishing Water Research Funds (operational and financial concern)
- Reorganisation of the networks (operational concern) will be set up

On the output level, reflections were made on concepts related to the operational and financial sustainability of the networks. Here, the breeding ground for the development of strategies is prepared, whereupon the strategies developed should become the roadmap for the post-SWINDON network. With reference to the post-2015 agenda, the strategies comprise higher education, knowledge transfer, and research activities. Further reference comprises the self-preservation of the networks in that, for example, sponsors exhibit their interest in the special expertise (“portfolio of competences”) of the network members, the biannual organisation of a

symposium on sustainable water management issues and transfer of theoretical (academic) knowledge into practical solutions. The implementation of a water research fund will allow research capacity to develop and grow, and to support internationalisation of post-SWINDON member institutions.

The approach to a regional “Competence Centres for Further Education” is regarded as an appropriate concept to ensure long-term perspectives and sustainable network activities in education, knowledge transfer, and research. Here, knowledge from universities (academia) and expertise from companies and state agencies can be brought together (Figure 4). The concept is on the one hand to guarantee and enable the dialogue between academics and practitioners from industry, NGOs, and state agencies and on the other hand to create the material preconditions (laboratories, offices, etc.) for joint projects, experiments, ...etc., and education and training. Furthermore, the concept is to integrate further education and training of water workers and engineers who are urgently needed in DC. The funding, for the most part, is to be performed by contributors coming from industry and state agencies or NGOs. The administrative and organisational tasks are to be performed by post-SWINDON network members. Against this background, as an outcome, a strategic tool will be available to strengthen the operational and financial sustainability.

Figure 4:
Competence Centre Concept (CoCCo) for knowledge transfer and further education

... Bringing university knowledge into practice ...

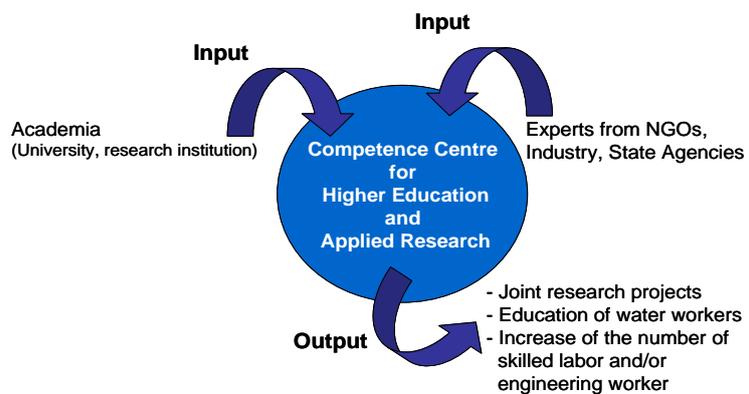
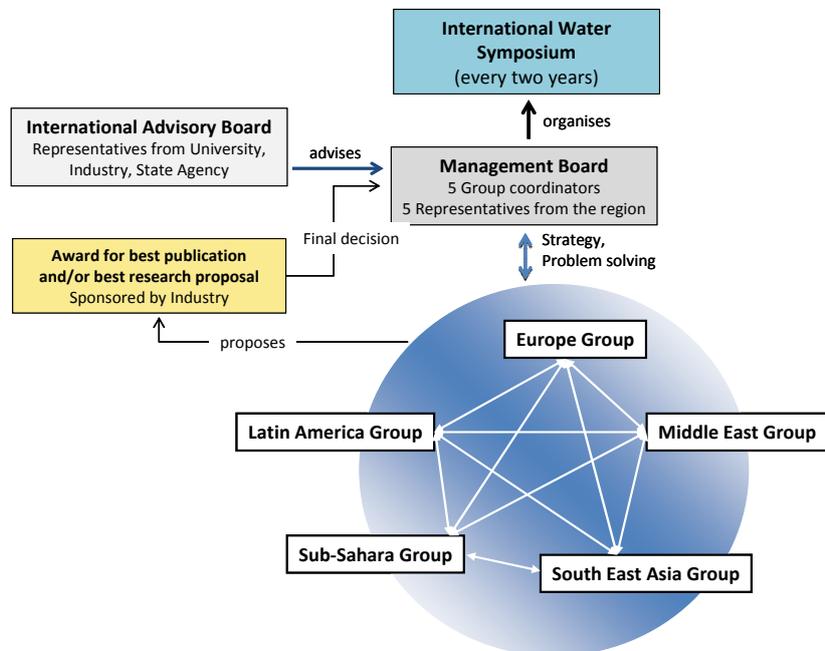


Figure 5:
Post-SWINDON Network



Another approach, which is particularly foreseen to ensure the operational sustainability of the post-SWINDON network, concerns the reorganisation of the network. Here, the network will consist of five equal regional networks (Figure 5). These five networks will be more or less act autonomously and provide their own organisational and financial (funding) structures. The trans-regional coordination, which comprises the activities of the entire network and the links between the regional networks, is taken over by the Network

Management Board (NMB). The NMB coordinates the trans-regional student and expert exchanges, joint research initiatives, and public relation of the entire network. One of the core tasks of the NMB will be the establishment and coordination (financial, organisational) of a biannual International Water Symposium (cf. Figure 5) that focuses on the exchange of knowledge and transfer of theoretical knowledge into practical solutions within the area of sustainable water management. The International Advisory Board (IAB) consults the NMB on technical and political questions and serves as “door opener” for creating contacts to representatives from NGOs, industry, and state agencies.

The concept of mobilising senior professors and creating a pool experts and sponsors is sought in order to strengthen the post-*SWINDON* network and to save its financial sustainability. The juridical form through which the network is carrying out its activities (e.g. administration of funds) must be developed according to the regional regulations.

In their contribution to the follow-up proposal, the four existing regional networks have created their own biases by focussing on regional research topics and regional demands for practical solutions applied to solve water-related problems. This approach, which directs scientific competence to practice-oriented transfer of knowledge, is expected to enrich the global knowledge pool and therefore enlarge the decision space of approaches, alternative solutions, and capacity. One practical way of promoting such approaches and research capacities is to establish “water research funds”, preferably with a regional scope. Such research funds are a feasible modality that allows research capacity to develop and grow. More importantly, it creates the institutional space to set regional research agendas and to build capacity to manage and refine those agendas. The concept of a water research fund can be used for financing future (beyond *SWINDON*) network activities. At least this will also contribute to the self-preservation and sustainability of each regional network. A thinkable financing of the fund is to raise membership fees paid by network members belonging to universities, industry, and NGOs.