BUILDING STRONGER UNIVERSITIES

IN DEVELOPING COUNTRIES

THE PLATFORM ON ENVIRONMENT AND CLIMATE

APPLICATION

DESCRIPTION, ACTIVITY PLAN AND BUDGET

(2011-2013)

Table of Contents

Summary

The Building Stronger Universities Platform on Environment and Climate (BSUPEC) has the development objective to contribute to informed and improved, sustainable natural resource management and environmental protection considering the needs for sustainable livelihoods, including adaptation and mitigation to climate change – through research capacity building in Ghana and Tanzania. The partners of BSUPEC in its initial phase are University of Ghana (UG), Kwame Nkrumah University of Science and Technology, Ghana (KNUST), University of Dar es Salaam, Tanzania (UDSM), and Sokoine University of Agriculture, Tanzania (SUA) plus eight universities in Denmark, and BSUPEC further links to researchers from two sectorial research institutions in Denmark.

Both Ghana and Tanzania are facing great challenges from climate change effects and environmental degradation, which are already affecting their economies. These challenges are among those addressed under the UN Millennium Development Goals, and they are recognised in national strategy documents in Ghana and Tanzania (PRSPs) as well as being an increasingly important component in Danida's aid programmes and the Danida Strategy for Development Cooperation. Coping with the challenges requires well researched knowledge as well as educated citizens and skilled researchers which points at universities for producing up-to-date BSc, MSc and PhD graduates that can deal with these issues.

Similarly all four African universities have the overall goal of strengthening the quality of education and research following the national strategies, and as part of a transformation process away from mostly producing BSc graduates to also having a significant share of MSc and PhD graduates. The direct motivation is that the newly acquired academic staffs often lack the required formal PhD degrees and sufficient research background to fill academic posts at the universities, as is also the case at other research institutions and in the industry. Based on this need assessment BSUPEC focuses on teaching and research capacity development specifically for PhD and MSc students to gain cross-disciplinary teaching-, research- and problem-solving skills.

Denmark has a long standing experience in high-quality education and research within environment and climate. For many decades Danish universities have successfully contributed to research capacity development through implementation of joint Africa-Danish research programmes and to capacity development (in particular through the Danida-supported ENRECA programme). The majority of projects have emphasized research education through training of young PhD students and by today several hundreds of associated PhD candidates have graduated from African or Danish universities. BSUPEC covers a total of 58 key Danish researchers of which several have world class standards in science and outreach. BSUPEC further covers 63 researchers with extensive capacity-building experience. The ongoing research projects related to BSUPEC represent an annual budget volume of 291 mill. DKK, of which less than a third is funded through Danida. The capacity building projects represent an annual budget volume of about 172 mill. DKK, of which approximately half is Danida funded.

Depending on level of funding BSUPEC will during the initial two-year period initiate a range of research education, research networking and outreach activities that in both the short and long-term perspective are expected to greatly increase the quality, output and communication of research and research-based education at the partner African universities. BSUPEC will further maintain and strengthen networking among Danish researchers in these areas.

1. Objectives, output and partners

1.1 Goal and development objective

The overall goal of the "Building Stronger Universities" initiative is to strengthen universities in south and north through long-term partnerships between universities in developing countries and in Denmark, and through this to 1) strengthen research capacity, 2) strengthen research-based education, and 3) strengthen dissemination of research-based information. This should enable universities to a) play an increasing role in the economic, social and political development of the societies in which they are located, b) function as nodes of innovation and knowledge production, providing solutions to local and global challenges, and c) produce skilled and motivated graduates that can contribute to the further development of their societies and address the challenges they face.

Based on this overall goal, the Platform on Environment and Climate (BSUPEC) has as its development objective to contribute to informed and improved, sustainable natural resource management and environmental protection considering the needs for sustainable livelihoods, including adaptation and mitigation to climate change – through research capacity building in Ghana and Tanzania.

1.2 Partners and process

To facilitate education and research on global change in developing countries (see Chapter 2), a few partners in Africa were initially selected, based on criteria such as strong education and research in this field of research, a geographical distribution of the activities, stable societies and a prior long-term collaboration with Denmark. In the longer term it is the strategy to involve more countries in Africa and beyond in the platform activities. In its initial phase the partners of the platform are University of Ghana (UG), Kwame Nkrumah University of Science and Technology, Ghana (KNUST), University of Dar es Salaam, Tanzania (UDSM), and Sokoine University of Agriculture, Tanzania (SUA). Participating Danish universities are Aarhus University (AU), University of Copenhagen (KU), Aalborg University (AAU), Technical University of Denmark (DTU), University of Southern Denmark (SDU), Roskilde University (RUC) and Copenhagen Business School (CBS). Further two Danish sectoral research institutes are linked to the platform: Danish Meteorological Institute (DMI) and Geological Survey of Denmark and Greenland (GEUS). The partners are described in detail in Chapter 3 and Annex 4.

The overall needs for capacity building were assessed for the south partners and described through two study visits with platform members from Danish Universities to the participating universities in Ghana and Tanzania in November/December 2010 and March/April 2011. The information gathered by six Danish platform working groups jointly with their African counterparts provided a basis for to identifying research areas of common interest. During the second visit to the south partners elaborate discussions were held on needs and activities and a Logical Framework Approach (LFA) matrix was developed (Annex 3). The draft versions of the application were commented upon and endorsed by all partners before submission. The capacity of the Danish resource based was addressed during a two-day workshop organised in October 2010, through questionnaire surveys and through meetings with two existing research networks: Danish Development Research Network (DDRN) and Danish Water Forum (DWF).

1.3 Needs for research capacity building

Both Ghana and Tanzania are facing great challenges from climate change effects and environmental degradation, which are already affecting their economies. People's livelihood is threatened unless action is taken to reduce pollution, improve management of land and water resources and adapt to the changing climatic conditions. These challenges are among those addressed in

the UN Millennium Development Goals and adopted by all UN member countries in 2000. The same development goals are recognised in national strategy documents in Ghana and Tanzania (Poverty Reduction Strategy Papers - PRSPs) as well as being an increasingly important component in Danida's aid programmes and the Danida Strategy for Development Cooperation (2010). Fulfillment of some goals are in reach in the countries, while many are still far from advancing as fast as planned - unfortunately the challenges are high on those issues to be addressed within the BSUPEC initiative.

Coping with the challenges requires well researched knowledge as well as educated citizens and skilled researchers which points at universities for producing up-to-date BSc, MSc and PhD graduates that can deal with these issues. This aim is totally in line with recommendations by pan-African organisations, e.g. *The African Union (AU) and the New Partnership for African Development (NEPAD) advocating improved access to and the quality of science and technology across Africa as a key to improving human resource development (*www.nepad.org*). Additionally, the African Ministerial Council on Science and Technology (AMCOST) emphasises the establishment of Centres of Excellence in research as well as stimulating intra-African collaboration and networking (AMCOST, 2010). The Association of African Universities (AAU) and the Inter-University Council of East Africa (IUCEA) have similar ambitious goals of research capacity strengthening across the continent.*

Similarly all four African universities have the overall goal of strengthening the quality of education and research following the national strategies, and as part of a transformation process away from mostly producing BSc graduates to also having a significant share of MSc and PhD graduates. The direct motivation is that the newly acquired academic staffs often lack the required formal PhD degrees and sufficient research background to fill academic posts at the universities, as is also the case at other research institutions and in the industry.

Based on this need assessment BSUPEC focuses on teaching and research capacity development of academic staff and in particular PhD and MSc students, with a view to gain interdisciplinary teaching-, research- and problem-solving skills.

1.4 Specific objectives

To assist in alleviating the identified needs BSUPEC has the following specific objectives related to the thematic areas of environment and climate:

1. Four sustainable research based educational programmes established and/or strengthened and recognised as programmes of excellence by 2016;
2. Up to five cross-disciplinary south-south-north research networks promoted and facilitated by 2013 as a tool for effective research collaboration;
3. Number and quality of PhD candidates and research publications progressively increased within platform lifetime;
4. Timely and effective dissemination of research findings established to society and to decision makers on environment and climate change impacts, mitigation and adaptation.

1.5 Outputs

Depending on the level of funding, the platform activities are expected to have delivered the following outputs at the end of the initial two-year period:

1. *Research education*:
   One operational and formalised contextual, high quality research education programme officially established at each of the four African partner universities with the following results:
   - Full mapping available of existing opportunities for research education at each university;

- Generic and thematic research methodology courses developed, approved and included in teaching curriculum at the south universities (jointly developed across the four BSU platforms);
- Up to 320 (16 × 20) MSc, PhD students and senior scientific staff having received formalised research education at courses and/or workshops (e.g., approved summer schools or other condensed courses);
- Up to 60 (4 × 15) senior scientific staff have participated in a course on PhD supervision.

2. *Research networks*:
   Up to five functional and sustainable south-south-north cross-disciplinary research networks established by 2013 with the following sub-results:
   - Platform sub-site and internet based discussion fora for each of the networks developed and in operation;
   - Demand-driven priority research areas identified defining focus of the networks (intra- and cross-platform);
   - One proposal writing workshop held in each network, back-to-back with each of the research workshops;
   - One thematic research workshop with compulsory manuscript presentations held back-to-back with each of the proposal writing workshops;
   - Up to 16 exchange visits done for post-docs and other senior research staff (south-south; south-north; north-south);
   - Relevant financial support provided to individual participants to acquire needed materials and support;
   - Up to five scientific writing workshops held at the African universities resulting in up to 25 submitted research publications;
   - Up to 40 submitted research publications for international journals through achievements within the research networks;
   - One joint experimental area identified in each African country for conducting cross-disciplinary research and existing data collected and documented.
3. *PhD project support*:
   - Up to 12 candidates for PhD studies identified jointly by south and north partners;
   - Up to 12 PhD scholarships initiated within the thematic foci of the research networks;
4. *Dissemination and knowledge management*:
   - A high quality knowledge base established/improved for proper and timely policy and decision making in the field of environment and climate change;
   - Research results and platform activities effectively communicated to relevant target groups at e.g. international conferences and national seminars;
   - Key findings related to platform research activities translated into research communications and policy briefs targeting needs of users;
   - Up to 8 PhD students or senior academic staff exposed to international scientific communities through conference attendance and presentations.

2. Academic focus

2.1 Environment and climate – challenges for sustainability

The environmental degradation, impending climate change, lack of energy, and dwindling water and land related resources are already now depriving many poor people in developing countries of sustainable livelihood and health opportunities and consequently the possibility for improving their living conditions, quality of life and welfare. Economic growth must be combined with environmental protection, maintenance of land and water resources, climate-smart management and

sustainable technologies. At any scale sustainable development requires access to knowledge, technologies and resources as well as support through better planning, infrastructures and other supporting institutions. These challenges were also included in the UN Millennium Development Goals (MDGs) adopted by all UN member countries in 2000. Fulfillment of some of the MDGs are in reach, while many are still far from advancing as fast as planned. The challenges are especially high when it comes to those issues to be addressed within the BSUPEC initiative. Meeting these huge challenges require the joint efforts of everybody in society. At the universities, the challenges also require collaboration between specialists from a wide range of disciplines from biologists and agronomists, engineers and physicists, to social planners, health professionals and lawyers. Interdisciplinarity is thus needed, and has to start at the university level during education of MSc and PhD students. Interdisciplinarity must also be embedded in the research that forms the basis for solutions to the sustainability challenges. Therefore improving skills within interdisciplinarity in research and education is pivotal to the approach taken for capacity building under this platform.

During the planning of BSUPEC activities researchers from the south and north universities have jointly identified five overall academic focus areas relevant to the platform:

- Sustainable land use and management;
- Sustainable water use and management;
- Energy and waste in rural and urban linkages;
- Climate change;
- Sustainable innovations and planning.

In practice these different themes can be difficult to separate since within a given geographical area (e.g. a watershed) all themes may be relevant. In the above listed themes, “Climate change” and “Sustainable innovations and planning” are cross-cutting, while the first three themes are related to a sectors or specific parts of a geographical area. There is a large focus on understanding the character of coupled natural and human systems with the aim of developing sustainable technologies to deal with problems and develop new opportunities for society. Additionally, the above mentioned environmental and climate change related focus areas cuts across the four BSU platform thematic boundaries with the potential for developing joint cross-platform activities to further strengthen societal relevance and academic output.

2.2.1 Sustainable land use and management

The agricultural sector in both Ghana and Tanzania and its future growth are central to sustainable land use developments since agriculture is the mainstay of more than half of the population, accounting for around 35% and 45% of the respective GDPs and is seen as vital for ensuring food supply and food security as important means to alleviate rural poverty (Ghana Growth and Poverty Reduction Strategy II, 2005; Tanzania National Strategy for Growth and Reduction of Poverty II, 2010). Further, improvement in land use and associated technologies are seen as an important vehicle for economic development of the societies at large and may have amble effects on the environment and local climate.

In the past decades, both countries have seen increases in their rural populations with related expansion of cultivated areas. Agricultural land use developments impact directly on other land-uses such as forestry and grasslands with related consequences on biodiversity and on the aquatic environment. Climate change will aggravate changes such as uncontrolled deforestation, habitat destruction and soil degradation due to expansion of the agricultural area coupled with poor land use and management practices. Under increasing temperature scenarios, it is anticipated that evapotranspiration and seasonal unpredictability with regard to rainfall will have serious consequences on crop yields, agro-biodiversity, reduced germplasm diversity as well as range-land area for livestock (Climate change, impacts, adaptation and mitigation in Tanzania – The CCIAM Programme 2009-2014, NORAD, 2009). This will tend to drive land use development

further in an unsustainable direction and contribute to accelerate climate change since forests and soils are important sinks for carbon.

In both Tanzania and Ghana there are many national interests in protecting wildlife and the integrity of the existing National parks as well as attractivecoastlines and monuments (castles), which constitute substantial revenue earners through tourism. The involvement of the local population and ensuring the livelihood through earnings on tourism is vital as it may secure the ecosystem values and protection of the environment, which the tourism is building on. It may further reduce local dependence on services from society and increase dependence on biodiversity ensuring the existence of the touristic attractions.

In both Tanzania and Ghana serious pollution from mining activities also poses an increasing challenge to the terrestrial and aquatic ecosystems albeit of limited geographical extent.

2.2.2 Sustainable water use and management

Water availability is critical for the livelihoods and health of the rural poor in Africa, mainly because aquatic ecosystems provide a number of critical ecosystem services such as fishing, firewood and flood recession agriculture. Globally, aquatic ecosystems (and not least those in warm countries such as Africa) are rich and diversified areas for biodiversity, providing habitats for several plant and animal species in the watershed, helping to absorb and slow floodwaters when rivers overflow. This ability to control floods can alleviate property damages and losses, and can even save lives, but can also have severe effects on the aquatic ecosystems including wetlands and downstream situated coastal areas. Aquatic ecosystems also absorb excess nutrients, sediments, and other pollutants and the capacity to do so and to tolerate pollutants depend largely on the health of these ecosystems.

Access to water is highly variable across the African continent, which is also the case regarding the practices of water resource management. The 17 countries in West Africa that share 25 transboundary rivers have notably high water interdependency. Eastern African countries are also characterised by water stress due to climate variability and wider governance issues. Water scarcity and surface water of poor quality contribute to a range of health problems including diarrhoea, intestinal worms and schistosomiasis and trachoma. Much of the suffering from lack of access to safe drinking water and adequate sanitation is borne by the vulnerable poor, those who live in degraded environments, and overwhelmingly by women and children.

In the 1990íes, about 25% of the African population experienced high water stress, and only about 62% had improved water supplies in 2000. The population at risk of increased water stress in Africa is projected to be between 75-250 million and 350-600 million people by the 2020s and 2050s, respectively. Climate change and variability will aggravate the water stress currently faced by some countries, including Ghana, while other countries, including parts of Tanzania, that presently do not experience severe water stress will become at risk of water stress.

Studies of the hydrological cycle as well as nutrient cycling, ecosystem dynamics and changes in biodiversity related to changes in land-use, irrigation, pollution and climate (change) are conducted in both Ghana and Tanzania, but need a higher degree of coordination and more integrative approaches.

2.2.3 Energy and waste in rural and urban linkages

Rural and urban settlements develop in accordance with economic development and modernization and place new and/or changing demands on planning for environmental and social services (water and sanitation, infrastructure, education, monetary credits and savings, land titling, etc.). Accordingly it is pertinent to understand 1) population dynamics such as rural-urban mobility and migration, rural urbanization (emerging urban centres), and peri-urban growth, 2) major changes in land use and land rights impacting on cultivation and habitation, 3) monitoring urban and peri-urban land use and land cover e.g. through using remote sensing.

Sewage treatment is a bleak topic in both Ghana and Tanzania. Sewerage is only organised in the centre of larger towns. Sewage treatment is not a prevalent feature and untreated sewage is commonly discharged to water bodies, limiting access to clean surface water without costly drinking water treatment, and polluting sea water near larger cities hampering tourism.

Waste is the wide concept of all materials, which are not usable by anyone in society. Thus there is a vast difference in types, amounts and money value of generated waste between developed and developing countries. The alarming aspect is that municipal waste management alone in many developing countries is accounting for up to 50% of municipal budgets in order to cope with collection, transport and disposal. Further waste processing steps (e.g. waste water treatment, composting and incineration of solid waste) may be adding to the costs as recovering resources are only able to cover a fraction of the expenses. The general situation in African cities is often unsightly waste littered anywhere and open waste dumps near the town limits. Administrative measures like deposits on items (bottles), anti-littering campaigns or introducing penalties for littering are often not used A positive note is that use of plastic bags is now prohibited in Tanzania.

There is an interest in regarding waste as a resource, which may be recovered and entering into the materials cycles again. This is possible for materials as metals, glass, paper and plastics. Less acceptable for recovery/reuse is organic (food) waste for animal food, and sewage sludge as fertiliser on land. The collaboration between the informal waste sector (scavengers), the formal sector (the municipality) and the private sector (contractors) is tested in several developing countries with varying success. Further development of this concept is definitely needed.

An important sustainability issue in developing countries is the rapidly expanding demand for energy for transportation and other services. Sustainable energy is a combination of energy efficiency and of energy production based on renewable sources. The main renewable energy source in tropical regions is the sun for electricity production, while wind may be useful at some locations. Utilisation of firewood and residues from agriculture, industry and organic municipal waste is often significant replacements for fossil fuels, and can be further improved by applying new methods and technologies.

The same approach is applicable to sustainable transport where improved or alternative technology may provide less energy consumption per unit transport work. Lowering the demand for fossil fuels in energy production may keep supplies of diesel and petrol for vital road transport for a longer future until proper technical substitution methods become available. Important measures include town planning and infrastructure improvements to reduce the total transport demand and transport time.

Climate change oil peak prices and energy supply security calls for renewable energy technologies to be of high priority in capacity building and for concrete solutions in Africa. Bioenergy is one of the renewable energy technologies, where Danish research has high competences and an international track record. Sub-saharan Africa is very rich in biomass. Such biomass has interesting potentials for being not only used for bioenergy but also for building new value chains and for significant amount of job creation. The technology most central for such knowledge-based growth and development is within the biorefinery technology platform, where left over products from harvested agricultural crops, agroindustry, or other waste streams can in a sustainable way be converted into value added products as food ingredient, upgraded animal feed, and fertilizer.

2.2.4 Climate change (cross-cutting)

Climate change is a cross-cutting challenge in society, because of the large consequences of climate change on livelihoods (in particular in developing countries), the associated needs and costs of adaptation, and because the need for reducing greenhouse gas (GHG) emissions (mitigating climate change) will entail large changes in technologies and society priorities.

There is a need to link climate change mitigation and adaptation with poverty alleviation, requiring 1) an understanding of GHG emissions and the abatement potential of different farming systems and practices; 2) incentives to realise the abatement potential; and 3) an understanding of livelihood responses. Sustainable land management can significantly increase soil carbon sinks and reduce emissions whilst improving adaptive capacity. The majority of the GHG abatement potential of annual cropping systems is increased soil carbon storage. Cropland management options include improved agronomic, nutrient and residue management practices - important measures to improve soil quality and productivity. However, biomass surplus is limited in the systems in question and carbon stabilisation limited due to fast organic matter turnover in soils. A farming system approach that includes considerations for the wider landscape, rather than plot based, is necessary to ensure additional soil carbon inputs in arable systems with altered biomass exploitation in the landscape mosaic.

Climate change mitigation is mostly reduction of GHG emissions. It often involves the use of alternative and renewable energy sources, biomass utilisation and efficient production and consumption of the energy produced; thus new types of energy systems must be developed in local communities engaging local farmers and businesses and other relevant stakeholders as for instance local governments and NGO's etc. Research on how to develop such renewable energy systems must hence revolve around the triangle: 1) Biomass and renewable energy resource identification; 2) Actual energy services required in a community; and 3) Technologies appropriate for converting the primary energy to meet the energy needed.

Adaptation to climate change essentially involves sensible adjustments made necessary by changing environmental conditions. The changes take place gradually and naturally within biological systems and to some extent within social systems. Since land and water management is critical to future developments of human societies, local and regional planning is crucial and has to be based on knowledge of future risks and possibilities. The capacity for both climate change modeling and for modeling and assessment of impacts in Ghana and Tanzania is limited.

2.2.5 Sustainable innovations and planning (cross-cutting)

Sustainable innovations and planning are cross-cutting challenges for combating climate change and implementing sustainable solutions related to climate mitigation and adaptation. An improved understanding of climate change and the impacts on land, water and energy use in developing countries is an important condition for developing solutions in response to the problems. At the same time this scenario provides opportunities for increasing the research capacity of the universities in their efforts to develop sustainable technologies and planning practices.

The intended sustainable technologies integrate social dimensions which consider the specific problems, needs and capabilities of local communities as explicitly expressed by the universities in Ghana and Tanzania. This underscores the need to strengthen the linkages between universities, industries and communities/government currently referred to as "Triple Helix collaboration and partnerships".

The technology involved in coping with the problems, improving living conditions, mitigation and adaption to climate changes and for environmental protection may be developed under the heading "sustainable technologies". The main challenge is innovating efficient technologies which are less costly and polluting and capable of sustainable resource use. This may involve adapting available technologies to the local context or encouraging and assisting local stakeholders to develop innovative solutions to their specific problems. Possible multifaceted barriers to these developments include lack of technical education (vocational schools), inappropriateness of current technologies, traditional norms and investment constraints. On the other hand, technological solutions alone may not be effective without supporting mechanisms, such as, the requisite legislation, fiscal measures such as taxation and investment, public acceptance, dedicated

education and other tangible ways of changing society's attitudes towards the path of unsustainable development.

Combining different technologies into integrated solutions to complex environmental problems is needed. In several cases, the technologies are well known, reliable and affordable; in other areas the needed and appropriate technologies have to be innovated. In order to secure efficiency, functionality and sustainable innovations in the long run it is necessary to go beyond simple technology transfer and secure local development of competences and capacity building. Furthermore, the institutional set-up is an important factor for long-term sustainability, since local ownership and commitment by existing institutions often are preconditions for the implementation of sustainable solutions.

This will involve both human and institutional capacity building, the former through education, professional development and creation of networks and mutual understanding of problems and solutions, whilst the later aims at enhancing the capacity of communities, NGOs, industry and governmental bodies to plan and implement sustainable solutions to the challenges of climate change and environmental protection.

2.3 National priorities of Ghana and Tanzania

2.3.1 Ghana

Ghana, like many other African countries faces considerable social and economic challenges. Ghana's population increased from the 6.7 million in 1960 to the current estimated figure of 24 million. The number of settlements in the country grew from 47,769 in 1970 to 56,170 in 1984 (an increase of almost 18%), with increasing urban drift; the proportion of urban population increased from less than a quarter of the population in 1960 to around 50% by 2006. The nation has made significant progress in development terms: the Human Development Index (HDI) improved from 0.444 in 1975 to 0.532 in 2006, life expectancy moved from 49.9 years in 1970 to 58.9 years in 2006 and adult literacy improved from 30% in 1970 to 76.9% in 2006 (Ghana Statistical Services; UNDP).

Agriculture remains the backbone of Ghana's economy; the agricultural sector employs 57% of the labour force (employed population aged 15-64 yrs) in the country; agriculture contributes 39% of the GDP and accounts for over 50% of the nation's foreign exchange earnings. However, Ghana's overall performance in terms of agricultural production and productivity remains inadequate; overall domestic production falls short of what the nation needs to feed its people.

Ghana is endowed with abundant natural resources, which have contributed and continue to contribute significantly to the cultural and socio- economic development on the nation. However, uncontrolled exploitation of these natural resources to meet the socio-economic needs and aspirations of people has led to severe depletion of the resources. The rate of forest clearing outside reserves is such that intact forests have virtually disappeared, except within reserves and small patches of sacred forests. Intact forest outside protected areas is currently estimates to be less than 1% of the original forest in the country. With the exception of a few rodent species, the populations of all species of wild animals in the country are completely depleted.

Apart from the degradation of natural resources, other environmental problems faced by the nation include air and water pollution, soil degradation, overgrazing and waste management. It is estimated that Ghana loses almost ten per cent of its gross domestic product (GDP) annually through environmental degradation. The nation's water resources are threatened by pollution of rivers from domestic and industrial waste, degradation of river catchments as a result of uncontrolled settlements development, agricultural and industrial developments, and unsustainable exploitation of forest resources within river catchments. Poor sanitation in the country is a major concern; available data indicate that only about 20% of waste generated by households is disposed of "appropriately"

Climate change is of serious concern to Ghana because of the nation's overdependence on climate-sensitive sectors, such as hydro-power generation, agriculture, fisheries and wildlife resources. It is projected from climatic change scenarios for Ghana that temperatures will continue to rise from 0.6^{o}C to 3.9^{o}C between the year 2020 and 2080, while rainfall is projected to be reduced on average by between 2.8% and 18.6% across the nation within the same period.

Ghana is committed to the attainment of the Millennium Development Goals to reduce hunger and poverty and ensure environmental sustainability. The Ghana Shared Growth and Development Agenda (GSGDA) advocates for the use of science and technology and innovations to accelerate agriculture to enhance food security and employment generation; complemented by effective natural resource management and environmental governance. The objectives and activities outlined under the BSUPEC therefore contribute directly to Ghana's national priorities.

2.3.2 Tanzania

Tanzania's natural resources are the main source of livelihoods and are the backbone of the country's main productive sectors such as agriculture, tourism, fisheries and mining. The relationship between economic development and the management of the environment and natural resources is emphasized in the National Environment Policy and the National Strategy for Growth and Reduction of Poverty (NSGRP. Ensuring environmental sustainability is among the eight UN Millennium Development Goals (MDGs). Addressing environmental challenges is among the ten priority areas of the Fourth Phase Government as proclaimed by the President of the United Republic of Tanzania in his first address to the National Assembly in December 2005. As a follow up, in March 2006, the Government adopted the Strategy for Urgent Actions on Land Degradation and Water Catchments to halt land degradation and to protect water catchments in the country.

Tanzania is faced with widespread environmental degradation, particularly of land, water, marine and coastal areas, lakes, dams and rivers. The National Environmental Policy identifies six major environmental problems for urgent attention. These are problems of: Land degradation; Access to good quality water for both urban and rural inhabitants; Environmental pollution; Loss of wildlife habitats and biodiversity; Deterioration of aquatic systems; and Deforestation. Several aspects of these environmental challenges are linked to widespread poverty dimensions. Furthermore, there are already observable climate change adverse impacts around the country.

Several key macro and sectoral policies and their corresponding legislation have been prepared or reviewed to reflect increasing demand towards environmental quality objectives. These policies include: Mineral Sector Policy; Wildlife Policy; Fisheries Policy; Forest Policy; Water Policy; Agriculture and Livestock Policy, Livestock Policy; Sustainable Industrial Policy; Energy Policy; and the National Land Policy. All these initiatives are consistent with the ongoing Public Sector Reform Programme, the Local Government Reform Programme, as well as the Vision 2025; National Strategy for Growth and Reduction of Poverty (NSGRP); and other National Strategies such as the Strategy for Urgent Actions on Land Degradation and Water Catchments. These initiatives are aimed at making sure that natural resources and other ecosystems are well managed for sustained environmental integrity which is a necessary pillar for sustainable development.

Tanzania's National Adaptation Programme of Action (NAPA) under UNFCCC from 2007 links the climate change challenge to the National Development Vision 2025 for high and shared growth, quality livelihood, peace, stability and unity, good governance, high quality education and global competitiveness. Since the economy of Tanzania is largely dependent on agriculture, it is imperative that sustainable development and societal economic growth must address climate change impacts on agriculture and other key economic sectors. The NAPA points to the agriculture, water, energy and forestry sectors and being the sectors of largest importance in terms of adaptation to climate change. For each sector there is a range of possibilities for adapt-

ing to climate change, some of which will also have other positive effects on the environment, and in some cases also for livelihoods, health and development. However, most of the opportunities depend on developing and implementing a broad range of proper technologies. These national objectives and strategies are fully in line with the scope of the BSUPEC initiative.

2.4 Danida's development priorities

The strategy for Denmark's Development Cooperation is described in the Danida publication "Freedom from poverty – freedom to change" from July 2010. The primary focus is on reduction of poverty. However, this can only be achieved if a range of preconditions are available, including the access to natural resources and a livable natural environment. The strategy names five political areas of priority, one of which is environment and climate. Within the environment and climate area, the Danida strategy is for Danish development aid to:

- Be a driving force for ambitious global targets for sustainable development;
- Increase developing countries' access to dependable and sustainable energy and encourage private sector involvement in the development of innovative solutions;
- Strengthen the environment and climate efforts in developing countries;
- Ensure that natural resources such as land, forests and water are managed sustainably;
- Alleviate climate-related humanitarian needs by stepping-up efforts to prevent disasters.

While BSUPEC will not specifically deal with global target for sustainable development, the platform will contribute importantly to such development at the local scale (Ghana, Tanzania), with wider implications in a long-term perspective to other African countries and beyond. In addition, BSUPEC will have all the other Danida topics as focus areas in both education and research. In line with the overall Danida development objective of contributing to the UN Development goals, the BSUPEC platform focuses on establishing the capacity within research and higher education for the countries themselves to perform the analyses and innovations to secure a sustainable development of their natural resources and at the same time secure stable, healthy and secure livelihoods for the population, in particular among the poor.

2.5 Focus areas for research capacity building

The needs assessment has shown a large need for increased research capacity within environment and climate for the societies in Ghana and Tanzania to cope with the increasing problems of pollution, depletion of quality of natural resources and consequences of climate change. It will not be possible within BSUPEC to cover the areas of interest and demand for research. Instead BSUPEC will focus on cross-cutting issues that can and will foster collaboration both among south partner universities and among different research disciplines. Based on the detailed and short descriptions above of the academic focus the following research topics have been suggested as possible for topics for research networking:

- Land use, land use change and management
- Natural resource management and technologies
- Soil, carbon and nutrient management
- Water resources management
- Waste generation, processing and reuse
- Sustainable energy and transport
- Livelihood and tourism – utilising ecosystem services
- Sustainable innovations and technologies
- Technology and planning solutions to challenges related to land, water, waste and energy
- Modeling of climate, climate change and their impacts
- Adaptation to climate change
- Mitigation by reducing greenhouse gas emissions

2.6 Links with other platforms

BSUPEC will collaborate with the other BSU platforms both with respect to research capacity building and in terms of promoting interdisciplinary activities. There has during the preparatory phase been an intensive collaboration between the platforms and this will be continued in the inception and implementation phases. BSUPEC has particularly strong links to the platform on *Growth and Development*, both due to the strong interlinkages between some research topics (e.g., on green growth and value chain involving sustainable use of natural resources), and because both platforms have chosen the same African partner universities. The visits of the Danish platform representatives to the African partner countries during the proposal preparation phase were therefore organised jointly between the two platforms. The two platforms have during the discussions decided on common governance systems at the partner universities to enhance synergies and ensure efficient administration.

BSUPEC also has strong research links to the platforms on *Health* (e.g., on environmental and climate change sensitive diseases) and *Stability, Democracy and Rights* (e.g., on governance schemes and stability consequences on environment degradation). Some of these issues for cross-disciplinary research could be undertaken in the experimental areas, where researchers with BSUPEC and across BSU platforms could join forces to study different aspects of changes in environment and climate and provide suggestions for solutions that benefit poor people and contribute to sustainable development of the societies.

BSUPEC will in particular collaborate with the other BSU platforms on developing and implementing course-based PhD programmes at the African partner universities. There will also be close collaboration on developing and implementing the generic research courses and the supervisor courses. BSUPEC will also collaborate with the other platforms on developing and maintaining the platform website to minimise costs for maintenance and updating.

3. Partners of BSUPEC

3.1 African universities

The four African universities all have as an overall goal the strengthening of the quality of education and research as part of a larger transformation process from emphasizing mainly BSc level education to having also a much larger volume of MSc and PhD graduates. The challenge in this transformation is huge, since a large proportion (about 50%) of the academic staff has no formal PhD qualifications and lacks a sufficient research background (Table 1). Both Ghana and Tanzania had a period of 10-20 years with a halt in filling academic positions at universities during the 1980s and 1990s. This has now resulted in an overrepresentation of staff close to retirement, and consequently a need to supply a large number of PhD graduates over the coming years just to fill the ranks. In addition, several new universities are being set up in the two countries, and these universities will also require academic staff with PhD qualifications. Similar qualifications will also be needed by research and development institutions in the two countries for translating research into full evidence-based solutions for meeting the needs for sustainable growth and environmental protection. There is therefore an almost insatiable need for new PhD graduates as well as a demand for a general upgrade of scientific skills in the academic work force.

All four African universities are very similar in terms of student and staff composition (Table 1). There is a ratio of about 10:1 in terms of BSc relative to MSc students within the BSUPEC relevant areas. All universities have plans to increase the number of MSc students relative to the BSc students. However, this will require more staff effort in terms of teaching and thus better training and more research experience of the academic staff. Only 10-20% of the academic staff is professors or associate professors, and only about 50% of the academic staff has a PhD. There is a strong interest both among the young staff to acquire a PhD and the needs for this

have been stressed by all universities in their strategy plans. This has for some of the universities (e.g., UDSM and SUA) led to initiate course-based PhD education programmes, where 1-2 years of the PhD education dedicated to coursework, often using a fixed curriculum. However, many of the BSUPEC relevant departments have during discussions advocated for more flexible course programmes that better targets specific needs of the students.

As an indication of the scientific status of the African partner universities a literature search was made in ISI Web of Science on a few keywords related to the topics of BSUPEC (Table 1). The years 2008 and 2010 were selected to illustrate the recent trends. There is for all universities an increase in the number of the published papers and also in the number of citations that these papers receive. However, compared to international standards this rate of publication is still very low, and clearly more efforts need to be given to international publishing of scientific results.

Table 1. Key statistics for the four African universities: University of Ghana (UG), Kwame Nkrumah University of Science and Technology (KNUST), University of Dar Es Salaam (UDSM) and Sokoine University of Agriculture (SUA).

	UG	KNUST	UDSM	SUA
Students (total)				
BSc	31739	22397	11771	~4000
MSc	2594	3905	2718	~500
Students (BSUPEC relevant)				
MSc	557	1234	696	803
PhD	48	34	-	90
Academic staff				
Professors	78	21	56	-
Ass. professors	119	56	112	-
BSUPEC	217	158	196	-
Lecturers	483	444	426	-
Total	897	748	790	486
Total with PhD (%)	44	~50	47	~50
Academic staff (BSUPEC relevant)				
Total	222	124	249	279
Total with PhD (%)	~50	55	~50	55
Peer-reviewed articles in ISI Web of Science (BSUPEC relevant)				
Articles, 2008	27	27	32	20
Articles, 2010	50	33	36	25
Citations, 2008	210	98	479	136
Citations, 2010	327	206	749	200

3.1.1 University of Ghana (UG)

University of Ghana (UG) is the largest university in Ghana and was established in 1948 as the University College of the Gold Coast for the purpose of providing and promoting university education, learning and research. The University College gained independent status in 1961 to become the University of Ghana. UG offers degrees in a range of disciplines including, Medical, Agricultural and Natural Sciences, Arts and Social Studies, at Diploma, Masters and PhD levels and is organized around Colleges, Faculties, Institutes/Schools and Centres of Research and Learning. UG is now establishing an Institute of Environment and Sanitation Studies, which will be very relevant for BSUPEC. The strategy of UG is described in its Corporate Strategic Plan, where the need to strengthen research and research education in emphasized.

UG is in active collaboration with many institutions and networks at the national level. The United Nations University Institute for Natural Resources in Africa (UNU-INRA) is hosted by the University of Ghana. The International Water Management Institute (IWMI) West Africa has its main office in Accra, and implements activities throughout the sub-region. In Ghana IWMI supports cross-institutional research and multi-stakeholder knowledge platforms on issues such as dam development.

At the regional level, the University of Ghana works closely with the global change SysTem for Analysis, Research and Training (START) which provides an international framework for such capacity building. UG is a member of the African Climate Change Fellowship Programme facilitated by START. The University is a member of the West African Research and Innovation Management Association (WARIMA).

From the end of 2010, UG has been in collaborative partnership with the Climate and Development Knowledge Network (CDKN) a UK based organisation supporting decision-makers in designing and delivering climate compatible development by combining research, advisory services and knowledge management.

UG's current vision and strategy focuses on enhancing academic excellence through research, teaching and learning, with emphasis on PhD training. The current low numbers of senior faculty with PhD or other terminal degrees to undertake high quality research makes the attainment of this vision a major challenge, not least within environment and climate.

3.1.2 Kwame Nkrumah University of Science and Technology (KNUST)

The university was established in 1961 from an earlier School of Engineering in Kumasi, as it was decided to create a full-fledged Kwame Nkrumah University of Science and Technology. KNUST has as its mission to provide an environment for teaching, research and entrepreneurship training in Science and Technology for the industrial and socio-economic development of Ghana, Africa and other nations. The strategy of KNUST is described in its Corporate Strategic Plan, where the need to develop high level human resource capacity for conducting research is emphasised.

KNUST recognizes the importance of general strengthening of the PhD education as both the skills of the future PhDs are improved in addition to the research capacity. The University has set up academic staff development programme as part of its strategic plan for improving the quality of teaching and research. Presently, the programme is inadequate compared with the required outputs due to limited supervision skills and unavailability of course elements. To improve the relevance of the programme these facilities will have to be provided. The University has targeted five percent increase in number of research projects undertaken annually whilst academic staffs are more rigorously assessed for progression and quality control through an institutionalised quality assurance scheme. Since research output is a core criterion for assessment and PhD Programmes are the key delivery channels for scientific paper writing there is a high staff motivation for PhD supervision but this has to be complemented with skills development and other requirements. Dissemination of research was furthermore highlighted in conjunction with general stakeholder engagement. Establishment of PhD schools, summer schools, Master classes, e-learning were highlighted as some of the important activities aimed at improved research education. The PhD schools presently planned for specific colleges and areas of specialization could be strengthened with inter-college core methodological and information dissemination courses. KNUST has initiated a number of international PhD programmes including AGRA PhD in Soil Science (Bill Gates Foundation) and a proposed WASCAL PhD in Climate change and Land-use for the West African sub-region (funded by Germany). These are challenging programmes as they require inter-college collaboration and coordination. International practices and experiences to be made available from Danish Universities may help overcome these challenges.

3.1.2 University of Dar Es Salaam (UDSM)

The University of Dar es Salaam (UDSM) was established in 1970. Prior to 1970, the university college, Dar es Salaam was an affiliate college of the University of London. Since 1961, the University of Dar es Salaam has grown in terms of student intake, academic units and academic programmes. The university has a number of colleges, schools and institutes of which the College of Engineering and Technology, the College of Natural and Applied Sciences, the Institute of Resource Assessment and the Institute for Development Studies are the most relevant for BSUPEC.

The strategy of UDSM is described in the UDSM five-year Rolling Strategic Plan from 2009. Here the strategic objectives are: 1) Access to university education should be expanded, 2) Quality of graduates should be increased, 3) Volume and quality of research and publications should be enhanced, 4) Volume and quality of public service should be enhanced, 5) Outreach, networking and partnerships should be strengthened, and 6) Institutional capacities should be strengthened. Most of these objectives fit perfectly with the BSUPEC objectives.

The Swedish International Development Cooperation Agency (Sida) has during 2010/2011 performed an evaluation of its support to UDSM. The draft evaluation report points at postgraduate training as the major way forward for UDSM. Its spin-offs are wide-ranging, and it offers opportunities for linkages and cooperation with other universities through sandwich and exchange programmes, thus strengthening the capacity in the country. It is further stated that the country's future direction depends on postgraduate training, as the ultimate source of all other educational interventions.

Some of the colleges at UDSM have started offering a course-based curriculum for PhD, and this has been endorsed by the leadership of UDSM. The aim is to greatly increase the throughput of PhD students. However, there is skepticism to this approach among some of the departments related to BSUPEC, primarily because the specific research skills required for successful PhD students within environment and climate cannot be gained though a very general curriculum. Further there is a need to also achieve interdisciplinary research skills, which are best achieved through working in research teams under good supervision – supplemented with knowledge gained through specific (intensive) courses.

3.1.4 Sokoine University of Agriculture (SUA)

Sokoine University of Agriculture (SUA) dates back to 1965 and transformed into a Faculty of Agriculture of UDSM offering Bachelor of Science in Agriculture and in 1984 transformed into a full-fledged University, the Sokoine University of Agriculture (SUA).The university is located in Morogoro. SUA currently offers 24 undergraduate and 39 postgraduate programmes in agriculture, forestry and veterinary medicine, environmental sciences and allied disciplines. SUA's main research objective is to provide leadership in basic and applied research in order to generate science evidence knowledge and innovations that respond to contemporary and emerging needs. SUA thus emphasizes that research becomes linked to development and societal issues. According to the SUA Corporate Strategic Plan, there is a need to further strengthen research and education, in particular at the postgraduate level.

SUA has over time been greatly supported by the Norwegian Agency for Development Cooperation (NORAD). NORAD continues to support SUA, and some of this support is now given under the CCIAM (Climate Change Impacts, Adaptation and Mitigation) programme that supports climate change related research in Tanzania. CCIAM supports three specific thematic areas that all are very relevant for BSUPEC: 1) Development of appropriate climate change mitigation and adaptation strategies in forestry, other land uses, ecosystems and biodiversity management; 2) Assessment of climate change impacts and vulnerability on ecosystem services and livelihoods under REDD initiatives; 3) Policy and legal framework analysis of climate change adaptation and mitigation with emphasis on economic efficiency, ecological effectiveness and wider politi-

cal legitimacy. The coordinator of BSUPEC has therefore already established contact to NORAD and to the coordination at UMB in Norway to ensure complementary in the approaches taken by CCIAM and BSUPEC.

SUA participates in the STRAPA partnership that is organised by Faculty of Life Sciences, University of Copenhagen, and which also includes Makerere University (Uganda) and University of Nairobi (Kenya). The objectives of STRAPA are to facilitate collaboration in undertaking research, training, extension, institutional transformation, management and other activities of mutual interest. Adding to this, it is the objective to share knowledge and activities to enhance the capacity and possibilities for all partners to carry out their professional tasks. The same four universities participate in the EU-funded PREPAREPhD project, which aims to upgrade the PhD educational programmes of the participating East African universities. This matches well with the BSUPEC objectives, and BSUPEC will seek to build on and integrate the experiences of STRAPA and PREPAREPhD.

3.5 Universities in Denmark

Universities in Denmark have for several decades been strongly involved in research related to environment and climate change, including developing both hard and soft technologies to deal with the challenges. Danish research in this area is both very productive and of high quality. This can be illustrated with publications on "climate change" in the ISI Web of Science, where a total of 1145 papers out of a total 65,839 were ascribed to research institutions in Denmark. The number of publications has been rapidly increasing recently. The average citation rate of Danish publications in this field is 19.4, which can be considered high given the relatively new area of research.

Partners from the Danish Universities in the consortium have a strong tradition for and are engaged in numerous capacity building projects in developing countries including Africa (Table 4). For many decades Danish universities have successfully contributed to research capacity development through implementation of joint Africa-Danish research programmes. The long-term, Danida supported "Danish bilateral programme for enhancement of research capacity in developing countries (ENRECA)" has been instrumental in its support to this process. The majority of projects have emphasized research education through training of young PhD students and by today several hundreds of associated PhD candidates have graduated from African or Danish universities. Overall, the BSUPEC represents an extensive past experience and good results in capacity building of PhD education in East Africa, including the STRAPA, PREPAREPhD, and the two inter-university consortia called SLUSE (www.sluse.dk) (Sustainable Land Use and Natural Resource Management) and DUCED-I&UA (Danish University Consortium for Environment and Development-Industry and Urban Areas). Both consortiaSE developed new approaches to courses at MSc level, which focuses on an interdisciplinary approach to the issues by taking point of departure in natural, agricultural, industrial, urban, social and cultural theories and methods. This problem-based learning approach has proven to be very successful, and BSUPEC will build on all of these experiences.

The scientific strength of the BSUPEC partnership is illustrated in Table 2, which shows the key researchers that have shown active interest in participating in BSUPEC. Of the total 58 key researchers, 19 have a h-index above 15, which within natural sciences signifies very productive scientist. As shown from Annex 4 and from the enclosed cv's several of the BSUPEC scientists are world class, both with respect to scientific publications and with respect to their participation in international academic and policy-related fora. Three of the key researchers in BSUPEC have and are thus contributing to the Intergovernmental Panel on Climate Change as coordinating lead authors or lead authors (Jørgen E. Olesen, Jens H. Christensen and Simon Bolwig). BSUPEC also covers social science related research (in particular within Sustanable innovations and plan-

ning). Within the social science area, the publication statistics in Table 2 is not representative of the scientific merits, since publications in this area often takes place in other forms.

Table 2. Statistics on scientific strength of participating Danish key researchers that have show active interest in participating in BSUPEC (detailed information in Annex 4). The publication statistics were taken from ISI Web of Science.

Area	Number of key researchers		Peer reviewed publications		Citations	
	Total	h-index >15	Total	2009-10	Total	2009-10
Land	5	2	274	49	3069	972
Water	8	6	819	125	18945	4949
Energy and waste	10	4	406	74	6556	1828
Climate change	15	6	877	127	12239	3665
Sustainable innovations	20	1	1013	147	279	45
Total	58	19	3389	522	41088	11459

As for the scientific strength there is also a number of key persons with long-term experience in capacity-building in developing countries (Table 3). There is a rather even spread of researchers within both the scientific strength and the capacity building across the BSUPEC focus areas, but with a larger number of persons involved within the cross-cutting themes on climate change and sustainable innovations and planning.

Table 3. Statistics on key persons with experience with capacity building in BSUPEC (detailed information in Annex 4).

Area	Number of key persons
Land	9
Water	2
Energy and waste	8
Climate change	24
Sustainable innovations	20
Total	63

There are many ongoing research projects within the BSUPEC focus area that are either fully or partially focused on developing countries (Table 4). These estimates represent a minimum since, for some projects it was not possible within the time period available to obtain detailed budget information. The ongoing research projects represent an annual budget volume of 291 mill. DKK, of which less than a third is funded through Danida. The capacity building projects represent an annual budget volume of about 172 mill. DKK, of which probably about half is Danida funded. Many of the research projects also have capacity-building aspects, but it has not been possible to specify the exact contribution of these projects to capacity-building.

The scientists listed in Tables and 2 and 3 and the projects listed in Table 4 also cover contributions from the two sectoral research institutions GEUS (Geological Survey of Denmark and Greenland) and DMI (Danish Meteorological Institute). Researchers from both institutions collaborate with researchers from universities in Denmark on research and capacity building in developing countries. They will therefore also be involved in activities under BSUPEC.

Universities in Denmark are also active in the area of environment and climate in other aspects. As an example University of Copenhagen hosts the secretariate of the UN CGIAR research programme on Climate Change Agriculture and Food Security (CCAFS), and Aarhus University is a key partner with FAO on defining and developing the concept of climate-smart agriculture, which seeks to promote synergies between climate change adaptation and mitigation

for smallholder agriculture in developing countries. The Technical University (RISØ) hosts the UNEP Risoe Centre on Energy, Climate and Sustainable Development. CCAFS, FAO, UC and AU jointly organised an international workshop in February 2011 on climate-smart agriculture in developing countries, which will pave the way for strengthening research and policy within this area.

Table 4. Number and budget (mill. DKK per year) of ongoing research projects with involvement of developing countries and of capacity building projects in developing countries during 2000-2010 relevant to BSUPEC (detailed information in Annex 4). The average annual budget was estimated under the assumption that projects had an average life-time of four years.

	Research projects (on-going, estimated)		Capacity building projects (recent 10 years, estimated)	
Donor	Number (total)	Average annual budget	Number (total)	Average annual budget
Danida	63	68.4	55	68.4
Other	43	195.7	23	28.9
Not specified	15	26.8	54	74.9
Total	121	290.9	132	172.3

For the past years, Danida has been supporting two research networks (Danish Development Research Network (DDRN) and Danish Water Forum (DWF)). Danida will cease to fund these two networks in 2011. Whereas DWF will continue to function based on membership fees, DDRN will most likely close. Both networks have had a substantial focus on environment and climate. They have also jointly formed the Climate Change Task Force, which have organised workshops and networking among Danish researchers in this area, and also provided policy relevant information. As part of this networking Danish researchers have been actively involved in setting up the Southern African Climate Change Network (SACCNet). BSUPEC will seek to integrate and maintain these networking and outreach activities.

4. Activity plan and budget

The activity plan described here covers the first two-year period (2011-2013). However, the research capacity building activities have a much longer time perspective. Specific activity plans have been made for three funding levels: 4, 7 and 10 million DKK/year. The activities are divided into five work packages (WPs) described in sections 4.1 to 4.5. Key preconditions, assumptions and contingency plans are described in 4.6 and the activities covered under the various funding regimes in section 4.7.

BSUPEC will apply a multifaceted approach to research capacity building, coordinated at both the south institutional scale (university) and across the platform partners. Central to the platform activities are the formation of research networks (WP2) around a set of selected topic areas within the scope of the platform, the number depending on the budget. The research networking will be supported by short-term scientific missions (exchange visits), proposal development and scientific paper writing workshops held at the south partner universities. The capacity of research staff to undertake efficient and high-quality research will be further strengthened by organising research educational courses (WP1) and by offering PhD scholarships specifically targeted to young university staff without a PhD (WP3). The results of the activities will be disseminated through a web-site, organisation of seminars, participation and presentations at conferences, and preparation of research and policy briefs (WP4). These dissemination activities will be used also to strengthen stakeholder interaction with research at the universities.

There will be an initial inception phase of four-five months, where the governance structure of BSUPEC will be implemented and the proposed activities specified and initiated. Care will be

taken during the inception phase to avoid overlapping other ongoing or planned activities and to engange in collaboration with those projects and programmes, where synergies can be obtained. The activities during the inception phase will in particular include:

- Agreeing the governance structure at individual universities and across the platform, including signing of MoUs and establishing WP-leadership and the platform coordination group;
- Defining the specific topics for which research networks will be established;
- Mapping of existing PhD courses at the southern universities as a basis for deciding on which courses to develop under BSUPEC;
- Mapping of needs for and interests in specific topics for coordinated research networks;
- Establishing a procedure for announcing and implementing PhD scholarships;
- Establishing a platform web-site.

The time-plan for the following period will be agreed during the inception phase, but priority will be given to rapid initiation of the following activities:

- Launching of research methodology courses and PhD supervisory courses;
- Launching of coordinated research networks;
- Arrangement of scientific writing workshops;
- Initiation of PhD scholarships.

4.1 WP1 – Research education

There is a strong need for the development and implementation of a portfolio of research methodology courses targeted PhD students and faculty researchers at all four universities, as only few courses are specifically targeted for PhD students and other staff and the courses are typically not compulsory. All universities expressed interest in having compulsory courses as part of the PhD training and some are in the process of established course-based PhD study curricula (e.g., UDSM and SUA). There is further a need to upgrade the PhD supervisory skills of senior faculty staff.

During the first five years a number of generic and thematic courses will be implemented. While the generic courses should train researchers in planning, methodology, communication and management of research, the idea with the thematic courses is to train researchers in holistic, trans-disciplinary thinking and approaches. The plan is to establish a regular cross-faculty research education programme under which a series of condensed courses may be offered. Courses will be developed and implemented jointly by the Danish and south university partners and should be complementary to courses already offered at the four south universities. The courses must be approved/accredited by the respective universities following the normal procedures for post-graduate course approval. The courses are open for all enrolled PhD students at the participating universities as well as academic faculty staff and qualified MSc students that fulfil the course-specific requirements for participation (in accordance with a "first come first serviced" principle), and in the longer term open for all national and exchange students.

The generic PhD courses may include:

- *A one-week face-to-face course on research methodology:* The overall objective of the course is to strengthen the knowledge and skills of participants in relation to planning, design, management and reporting of research projects. Specific areas may include: research theory, research ethics, development of research objectives, qualitative and quantitative research methods, questionnaire design; data handling and statistics, reading and writing skills, oral presentation skills, research tools like GIS and simulation modeling, and knowledge management.
- *A one-week face-to-face course on research communication:* The course recognizes that communicating research activities and results to the public must be supported and encour-

aged at individual and organisational levels. Included are training in writing scientific articles; organizing dialogue meetings with relevant stakeholders and dissemination of results through popular media. The course will address structural challenges for communication within a research project and how to reach target groups during and after the research activities.

- *A one/two-week e-learning course on research management:* The course will focus on managerial aspects of the research, including how to write a research application (proposal development), contract negotiation, managing a research project, communication, visibility and uptake of research, and monitoring and evaluation. Generic modules for such a course is under development and currently being peer reviewed and tested in collaboration with NEPAD African Centres of Excellence on Water Research.

The thematic courses may include:

- *A one-week face-to-face course on advanced methods in global change research*: The objective of the course is to introduce the range of advanced methods and technologies available for studying environment and climate issues. This includes remote sensing, GIS, flux measurements in land and water ecosystems; land use modeling, groundwater and surface water modeling, climate modeling, sustainable waste management, sustainable energy solutions.
- *A one-week face-to-face course on data treatment:* The overall objective of the course is to strengthen the capacity of the students to 1) collect and handle large dataset obtained from databases, remote sensing, experimental areas (see Section 4.2.4), interviews and censuses; 2) statistical analyses and modeling of large datasets; and 3) be able to work and synthesize data from local to global scales and across disciplines (both natural and social sciences). The theme in focus will vary from year to year (with a three year rotation) allowing students with specific interest to join one course during their PhD and students with broader interest to join several courses.
- *A one-week field-based course on planning and conducting field studies:* An inter-institutional, trans-disciplinary course with focus on training in analysing and developing project proposals; planning and conducting field studies; selection and application of data collection methods (e.g. questionnaire design, interview techniques, bio-physical sampling methods, PRA techniques); data recording and processing; and writing field reports. The major theme in focus will vary from year to year (with a three year rotation) allowing students with specific interest to select the course of most relevance for their PhD.
- *One-week specific courses* depending on the outcome of the mapping of existing PhD courses at the southern universities and the match with skills of the Danish universities.

A two-day face-to-face course on PhD supervision will be developed and offered to all interested senior staff with PhD supervisory responsibilities. The course will focus on rules for PhD students and their study and exam requirements, process management, aligning expectations, giving text and oral feedback, research techniques, and techniques for conflict management.

The plan is to develop more efficient and more specific north-south and south-south research training over the coming five years, taking advantage of the suit of courses available at partner universities in both the South and North and help in unifying and stimulating collaboration. These include e-learning and online PhD Training System that are under development or already available.

The generic courses, the supervisor courses and the organisation of the PhD programmes will, when relevant, be implemented in close collaboration with the other platforms in “Building Stronger Universities”. The initial step towards development and implementation of the courses will take place during a workshop in the South organised with the Platform Working Group at the respective south university (see Section 5.1), and the specific courses offered will depend on stocktaking of the existing courses and the need for new courses at each university performed during the inception phase. To facilitate sustainability of the training activities the courses will

be implemented twice as Training-of-Trainers (ToT) courses with Danish teacher participation and face-to-face interaction. After this intensive stage, the implementation of the course will be in the hands of the ToT trained course responsible persons at the south university with interaction and discussions with the Danish counterparts through e-mail and Skype.

4.2 WP2 – Research networking

The research environments at the universities in Ghana and Tanzania suffer from a range of deficiencies, which limit their capacity to efficiently undertake research and educate skilled PhD students. These deficiencies include: 1) lack of access to modern research facilities and equipment, 2) small and fragmented research groups, 3) few researchers with formal research training (PhD degree), and 4) lack of funds for meeting specific needs for conducting planned research within ongoing MSc and PhD studies. Some of these deficiencies can be overcome through efficient networking by which researchers from different research groups and different universities collaborate to share knowledge and equipment, develop new research ideas and proposals, and make better use of existing data and knowledge to produce high quality scientific results that is also communicated to society and decision makers. BSUPEC will, during the first two-year phase, implement four different research networking activities: 1) Operationalising coordinated research networks, 2) Effectuating short-term scientific missions (exchange visits), 3) Conducting scientific writing workshops at south universities, and 4) Establishment of joint experimental areas. After this initial phase the networking activities will be evaluated and changes in the networking modalities may be taken.

4.2.1 Coordinated research networks (CRNs)

To advance high class research and to complement and support the research education programme coordinated networks of researchers and faculty supervisors at the collaborating universities with mutual interests will be created. The CRNs will be valuable and very visible models for collaboration to fulfill the goals of the BSUPEC, and at the same time help those involved to conduct relevant research of importance for their respective institutions and to society. The active researchers are thus assisted in conducting timely and innovative research thereby promoting and enhancing their career possibilities. The CRN model builds on long and successful experience from UN-IAEA funded research programmes (http://www-crp.iaea.org/html/about-us.html). A CRN is meant as a tool to:

- ease contact between researchers interested in the same topic;
- enhance the exchange of knowledge between researchers, faculty and PhD students, within and between participating institutes at the collaborating universities (south-south; south-north networks);
- encourage the researchers to investigate various aspects of the same theme and to report findings at organised workshops and seminars;
- to facilitate applications to funding agencies for additional funding for the active researchers; and
- encourage preparing joint manuscripts for publication and support less experienced scientists in writing articles;

Research efforts between universities supported by the platform will normally be carried out within the framework of CRNs. These are developed in relation to a well defined research topic agreed upon by an appropriate number of collaborating partner institutions. CRNs provide opportunities for faculty and scientists at the collaborating institutions to conduct the more "upstream" types of research in which strategic and applied issues with their subsequent opportunities for spill over driving the research agenda. The CRN thus represents an effective means of

bringing together south and north researchers to solve a research problem of common interest within BSUPEC research themes.

Each CRN is essentially a network of scientists working within an operational framework for research with a similar and well defined global or regional thematic or problem focus which is relevant to, or can be tackled exploiting natural science, technology and social sciences. A CRN is characterised by:

- Having up to 15 scientists, the majority from the South, with a duration of three-five years;
- Senior university scientists from any of the partner universities may act as a CRN coordinator, and is financially compensated according to workload;
- A network workshop organised between partners every one-two years in one of the participating countries with participation paid for by BSUPEC and presentations on achievements by participants compulsorily published, and co-authoring is encouraged;
- Financial support to each active researcher (faculty staff, PhD students) in a CRN with a magnitude depending on the topic (e.g. to acquire books, chemicals, travelling, involvement of students etc.)

4.2.2 Short-term scientific missions (STSM)

Two types of short-term scientific missions (exchange visits) will be launched to support and further strengthen North-South and South-South networking activities and knowledge exchange. STSMs will typically have durations of about one month and involve a person from a participating university staying at another partner university. The activities can be manifold, including participation in research courses, preparing project proposals, using specialised equipment for analysing samples, jointly data analyses and writing joint manuscripts. Individual researchers or PhD students can apply for grants. The application should describe the objectives of the exchange visit, an activity plan for the mission and a budget.

4.2.3 Scientific writing workshops

Proper analysis of data and preparing scientific manuscripts for international journals is often a major obstacle for academic staff at most southern universities. This can be at least partially overcome by organising scientific writing workshops. These workshops will be held at each southern university with researchers from Danish universities taking a lead role. Prior to the workshops, draft manuscripts will be circulated among the participants and they will be asked to review and comment on at least three-four manuscripts. During the workshop recommendations on manuscript improvement will be given, and plans for revising the manuscripts will be made. Following the workshops, participants are expected to submit their manuscripts to a journal within a six-month period. These workshops can also be used for developing proposals for joint research.

4.2.4 Joint experimental areas

In order to order to strengthen the interdisciplinary and cross-university, cross-national activities as well as a holistic approach, one joint experimental areas for research and education will be established in each participating country. The idea is to establish well equipped observatories for long-term studies. These geographical areas have to be selected during the first two-year phase, and could include river basins, wetlands, coastal zones, transition zones between dry and wet, forest and open areas, cities etc. The exact areas selected will be defined during a workshop held in each country with participation of both researchers and stakeholders. Subsequently during the two-year period existing data and information for this area will be collected as a basis for decisions on further instrumentation and for designing new studies. The platform will develop a web-based data storage system and in the longer term a hierarchical database initially for internal use

by partners, but potentially later for a larger audience. This facility will not only be very valuable for research and PhD studies, but will also provide data and results valuable for problem-based teaching at BSc and MSc levels.

4.3 WP3 - PhD project support

The PhD project support scheme including PhD scholarships is primarily intended for permanent faculty staff without PhD qualifications. For the permanent faculty staff to be granted a PhD scholarship under this initiative, the fellow will for the duration of the fellowship be freed from his/her normal responsibilities (teaching, administrative work etc.), while the university will continue to pay the regular salary and benefits. To be eligible for the scholarship, the candidate must be below 35 years of age without a prior enrolment as a PhD student.

The general principles for the PhD scholarships are: 1) fellows will be enrolled at one of the four universities in the South and the scholarships will have a three-year duration; 2) the targeted research should be within the focus area of one of the topics of the research networks within BSUPEC; 3) Scholarships will have joint supervision with the principal supervisor from the south partner university and the co-supervisor from one of the Danish universities; 4) scholarships will be implemented as a "sandwich-model"; 5) students are obliged to do course work equivalent to a half year of study; and 6) the thesis should result in a number of scientific research publications, which preferably should be included as manuscripts in the thesis.

The PhD scholarships will be announced by the universities following standard criteria that will be defined during the inception phase. Eligible applications are selected by the university-specific Platform Working Group using standard criteria. The Partnership Steering Committee will make the final selection of candidates based on quality of the applications, but also taken into account other issues, such as balance between departments, academic focus areas and gender. These additional considerations must be achieved without compromising the quality of the enrolled PhD students.

For each individual scholarship granted under BSUPEC, it will be considered whether it will be relevant to pursue a double degree, i.e. the PhD student upon successful defence of dissertation is awarded a PhD certificate from both the university of enrolment and the Danish university from where the student have received co-supervision and spent part of his/her study time. In case a double degree is pursued, a specific agreement has to be signed by both universities at the onset of the study and the agreement has to be approved by the PhD Committee at the relevant Danish university.

Efforts will be made to expand the number of PhD scholarships offered through additional external funding and to also acquire additional support for stays of Danish PhD students and Post Docs at the four south universities in order to further enhance the north-south collaboration.

4.4 WP4 - Knowledge sharing and dissemination

To facilitate knowledge sharing and dissemination, the platform will develop and maintain a platform website. The website will be a forum for communication and knowledge sharing among participants directly involved in the platform, and for dissemination to outside stakeholders and the general public. The website will be developed with an open-to-all part and an internal part only open to platform partners. The web-site will hold announcements on courses, PhD scholarships, call for workshops and proposal for exchange of staff. Moreover, there will be detailed information available on the on-going activities funded by the platform, including research briefs on scientific results obtained within BSUPEC and policy briefs that translate research findings into policy relevant information. On the internal part, curriculum and materials for all implemented PhD courses/other courses will be documented. The website will be managed by the platform coordinator, who is also responsible for an electronic newsletter four times annually. In addition the following dissemination activities will be undertaken:

- Contribute to public lectures and interviews etc. in media;
- Formulate policy briefs based on research results;
- Participate and present research findings in relevant scientific conferences;
- Write short research briefs based on published research papers;
- Conduct scientific meetings with stakeholder participation for dissemination and uptake of research.

To improve networking among the researchers at Danish Universities the platform will support thematic working groups by providing funding for organising meetings and conferences that also engage other stakeholders in Denmark. These activities will be coordinated with the Danish Water Forum (DWF) network, and it will incorporate the activities of the research network called "Climate Change Task Force" under the auspices of DWF, Danish Development Research Network (DDRN) and the Danish Research Network for International Health (Enreca Health).

4.5 WP5 – Platform coordination, management and governance

The overall activities of the platform will be co-ordinated by a Platform Secretariat in Denmark. The platform coordinator will be responsible for the initiation of strategy processes, action plans and follow-up on the strategies and will participate in fund raising for platform activities in close collaboration with the chairman of the platform. In addition, the coordinator will:

- Contribute actively to the development, organization, coordination and implementation of the activities of the platform;
- Sustain and further develop networking activities and strengthen the involvement and cooperation of the resource base in Denmark and in the South partner countries;
- Facilitate dialogues and consultations between researchers, policy makers and stakeholders,
- Take initiatives to ensure a high level of communication among platform members;
- Coordinate and organize larger workshops and conferences for the resource base in Denmark and South partner countries, by also supporting thematic working groups in Denmark;
- Manage the overall grant of the platform;
- Further develop and maintain the platform website.

At each southern university a technical coordinator will be appointed to support the Platform Working Group with respect to coordination of activities and to ensure timely technical and financial reporting.

4.6 Key preconditions, assumptions and contingency plans

The project is subject to several risks, which are specific to each country and collaborating institutions. The risks include technical, financial, policy and sustainability aspects. However, the success of the project will heavily rely/depend on key assumptions and preconditions as identified and outlined below.

The key assumptions include: 1) Research and research capacity development is recognized by relevant stakeholders as important for short and long term environmental protection; 2) Proper uptake of research results at the levels of policy and decision-making; 3) Research agendas, partnership approaches and capacity development targets are relevant to country priorities; 4) Partner universities have sufficient, well-recognized scientific and research capacity development skills and experience; 4) Research, education and management competences available among partners; 5) Suitable geographical area with available information (data) available for research and education purposes (e.g., experimental areas); 6) Research networks have sufficient leadership to motivate and engage network participants; 7) Existing trust among collaborating institutions/researchers is maintained; and 7) Research policy in partner institutions remain the same.

These assumptions will only hold if the following key preconditions will be met; 1) Danida maintains its commitment and support to research capacity development in a development context beyond the initial two-year period; 2) All partner universities fully committed to long–term south-south-north collaboration; 3) Danish universities will commit the necessary funding for completing the initiated PhD projects, if Danida decides not to continue funding; and 4) There is a sufficient number of qualified staff without PhD present at south universities for filling the PhD positions within priority areas.

The aim of the BSUPEC risk management is to identify and analyse these risks, to define measures that will reduce the likelihood of their occurrence and that will reduce the impact if the risk does materialise. Financial, administrative and legal risks are minimised through a professional project management, organised from the BSUPEC secretariat with clear guidelines for all participating institutions. The risk related to scientific networking and collaboration will be minimised through selection of experienced partners with recognised expertise and long-standing track records to lead the Platform Working Groups and the Coordinated Research Networks. In case of lack of performance measures will be taken to replace these persons. The BSUPEC coordinator will provide all required instruments to adopt and implement contingency plans. Remedial measures may, for instance, include the provision of special assistance to partners, or the redistribution of tasks among partners or the provision of external help.

4.7 Budget

With regard to budget, and its division among partners, the activity plan and budget stipulates an equal sharing (50-50) of the core funding between Danish and Southern partners in the initial two-year phase. According to Danida guidelines 20% overhead rate is used for Danish Universities and 7% for south universities. The activity plan stipulates a more or less identical activity level at UG, KNUST, UDSM and SUA, and hence the available core funding is equally divided between them in the first phase (Table 5). In the current budget there is not a complete 50:50 share between budget for Danish and African activities. This is due to the fixed rates applied for the various activities. However, during the inception phase the budget will be revised to ensure equal budget contributions (including overheads) between North and South. The in-kind funding by Danish Universities is to be equal to the Danish part of the Danida core-funding, and this budgeting will also be revised during the inception phase. Detailed budgets for the three funding levels in the first phase are attached in Annex 1.

Table 5. Budget divided between the five different work packages for the three budget scenarios.

	WP1	WP2	WP3	WP4	WP5	Total ex OH	Total inc OH
8 mill.							
N core	1.078.440	855.130	-	304.800	1.030.820	3.269.190	4.069.190
S core	400.000	1.848.600	-	319.280	1.020.000	3.587.880	3.867.880
N in-kind	696.000	1.066.000	-	200.000	1.744.000	3.706.000	4.506.000
14 mill.							
N core	1.437.920	1.350.780	598.320	304.800	1.630.820	5.322.640	6.722.640
S core	600.000	3.425.200	975.333	398.560	1.340.000	6.739.093	7.229.093
N in-kind	928.000	1.900.000	664.000	200.000	1.940.000	5.632.000	7.032.000
20 mill.							
N core	1.797.400	1.740.755	1.794.960	304.800	1.630.820	7.268.735	9.268.735
S core	700.000	4.407.880	2.926.000	319.280	1.660.000	10.013.160	10.713.160
N in-kind	1.160.000	2.422.000	1.992.000	200.000	2.280.000	8.054.000	10.054.000

Within the first two years, the platform will establish the following capacity building activities for the three funding scenarios as also shown in Table 6.

Scenario 1: 4 million DKK per year

- **Research education** targets training of academic staff and PhD students at the four southern universities in Ghana and Tanzania. The training will be based on intensive courses, each of duration of one week. In total four generic courses on research methodology; four courses on PhD supervision and four platform specific thematic courses including lab/field experiments will be supported.
- **Research networking** targets academic staff and PhD students at southern universities. The activities include establishment of two coordinated research networks of each up to 15 participants from Ghana, Tanzania and Denmark, respectively, and funds to support leadership of the networks, a five-day workshop as well as research activities of the participating members of the networks. In addition 4 South-North and 8 South-South short-term (one month) scientific missions will be launched in order to support and further strengthen joint North-South and South-South networking activities and knowledge exchange. During the exchange visits the southern guest researchers will undertake research (e.g. data analysis, write up of joint papers or proposals) in collaboration with Danish partners or other southern partners. Finally four scientific writing workshops will be supported at southern universities in order to encourage manuscript and proposal writing.
- **Knowledge sharing and dissemination.** A joint North-South website including both intra- and internet surfaces will be established as an efficient working tool for exchange of information (data), knowledge and communication of platform activities and progress to the wider public. Funds will be made available to cover the salaries at North and South for website mastering and updating. In addition, means will be set aside for encouraging international conference participation of post-graduated staff at southern universities. Moreover, two types of one-day seminars will be held; one in the South with stakeholder participation and one in Denmark including invited speakers.
- **Platform coordination, management and governance.** A) Steering committees and working groups at southern universities with a budget to support participation of one representative from Denmark for the annual steering committee meetings and working group meetings at southern universities. B) Platform coordination in Denmark. There will be a budget to support the coordinator and secretariat in Denmark with a part-time salary (six months per year) and a limited lump sum for running costs. C) Platform coordination in the South with a budget to support coordination at each university in the south covering three months per year at each university (to be supplemented by the other BSU platforms operating at the same universities). In addition, funds will be set aside for external audit at each of the four southern universities and for the Danish secretariat. D) Inception workshops and meetings at each South university to ensure development of joint actions plans and terms of reference with a budget to support participation for three northern experts on capacity building.

Scenario 2: 7 million DKK per year

In addition to what is described for the 4 mill. DKK/year scenario, the activities comprise:

- **Research education.** Four additional platform (specific) thematic courses including lab/field work;
- **Research networking.** Two additional coordinated research networks and four additional South-North short-term scientific missions as well as four additional scientific writing workshops in the south;
- **PhD project support.** Four PhD scholarships (one at each southern university) including budget for supervision and examination as well as research travel and research and educational stays for two times five months stay at Danish Universities. The PhD scholarship is

covered by 2/3 for the two-year period, assuming funding for PhD year three will be covered by a subsequent BSU grant;

- **Knowledge sharing and dissemination.** Additional four grants for international conference participation of post-graduated staff at southern universities will be supported.
- **Platform coordination, management and governance.** The working months of both the platform coordinator in Denmark will be increased to full employment (12 months annually) and the four coordinators at the southern universities will be increased to make up for four months annually at each university in the south.

Table 6. Platform activities under the three budget scenarios.

Platform Capacity Building key activities - 2 year period	**8 mill DKK** Number	**14 mill DKK** Number	**20 mill DKK** Number
WP1: RESEARCH EDUCATION (Post-graduate and senior staff)			
Generic course on research methodology; 1 week, 2,5 ECTS	4	4	8
Thematic course incl. lab/field work; 1 week, 2,5 ECTS	4	8	8
PhD supervisory course; 1 week	4	4	4
WP2: RESEARCH NETWORKING (Post-graduate and senior staff)			
Coordinated Research Network; 5-day workshop, leadership, funds for research support for 15 participants	2	4	5
Short-term Research Missions; S to N, aver. 1 month stay, incl. course	4	8	8
Short-term Research Missions; S to S, aver. 1 month stay	8	8	8
Scientific writing workshop; 1 week	4	4	5
Joint experimental areas in Ghana and Tanzania; one pr. country	0	0	1
WP3: PHD PROJECT SUPPORT (Post-graduate staff)			
PhD Scholarship with joint N-S supervision (2/3 PhD covered)	0	4	12
WP4: KNOWLEDGE SHARING AND DISSEMINATION (Post-graduate and senior staff)			
Website development, mastering & updating (N & S)	1	1	1
International conference participation; 4 days stay	4	8	4
Seminar in South with stakeholder participation	4	4	4
Seminar in Denmark with invited speakers	1	1	1
WP5: PLATFORM COORDINATION, MANAGEMENT AND GOVERNANCE			
Coordinator/Platform Secretariat Denmark*	1	1	1
Coordinators S**	4	4	4
Platform Steering Committee; annually meetings with chair at S	1	1	1
Platform Working Group; annually meetings with chair at S	1	1	1
Inception phase; 3 ps. from N to S, 1 week stay at each university in S	1	1	1

**Coordinator in Denmark funded part-time by DANIDA at the 8 mill. scenario and full time at the 14 and 20 mill. scenarios, while the chairman of the platform works 3, 6, and 6 months pr. year at the three different scenarios.*
***Coordinators in South working in total 24, 32 and 40 months, respectively, for the three different budget scenarios and for all four universities. To be supplemented by other BSU platforms.*

Scenario 3: 10 million DKK per year

In comparison to what is described for the 7 mill. DKK/year scenario, the activities comprise:

- **Research education.** Four additional generic courses on research methodology will be supported;
- **Research networking.** One additional coordinated research networks and one additional scientific writing workshop will be launched; Joint experimental areas (one in Ghana and

Tanzania, respectively) for research and education will be initiated by a two-day workshop bringing up to fourteen researchers and stakeholders together in each country. In addition salary expenses at south to support collection of information and existing data for the experiment areas will be covered as well as for development of a web-based data storage system and database.

- **PhD project support**. Eight additional PhD scholarships (in total three at each southern university) will be supported.
- **Knowledge sharing and dissemination.** Four grants less will be supported for international conference participation;
- **Platform coordination, management and governance.** The working months of the four coordinators in the south will be further increased to 5 months annually at each university.

5. Platform management and governance

5.1 Decision-making structures

The management of the platform will be carried out in accordance with the overall management structure of the BSU initiative and with the Memorandum of Understanding, which have been signed between the participating south universities and Universities Denmark.

To manage the platform activities four different coordination and control bodies will be established to ensure collaboration within BSUPEC and with other platforms under BSU and to foster north-south and south-south collaboration. This includes a 1) Platform Working Group at each African university; 2) Partnership Steering Committee between each south university and Universities Denmark; 3) Danish Platform Steering Committee; and 4) Platform Coordination Group. For all these groups and committees there will be no honorarium or salary paid for preparation or participation in meetings, since these costs are considered a contribution by the institutions. However, the platform will cover travel, food and lodging costs in connections with the meetings, when applicable.

5.1.1 Platform Working Group at African universities

A Platform Working Group will be established at each African university with the task of ensuring the implementation of the activity plan, which will include:

- Identify topics for research networking;
- Plan and initiate research courses carried out under the platform;
- Reviewing applications and qualifications of candidates for PhD scholarships and for short-term scientific missions;
- Discussion on north-south and south-south collaboration, and reviewing proposals for collaboration;
- Discussion on initiatives to enhance research productivity and quality within the environment and climate;
- Discussion on initiatives to enhance interdiciplinarity in education and research within the platform areas;
- Review progress of the platform at discuss the annual progress report;
- Prepare plans for the subsequent phase of the platform.

The Platform Working Group will consist of four members appointed by the Vice Chancellor of the university and a representative from Universities Denmark appointed by the chairperson of the Danish Platform Steering Committee. The Platform Working Group will meet at least once every year. Between meetings members will communicate via phone or electronically. Minutes

of meetings will be made available on the platform web-site, and support for this will be given by the platform coordinator.

5.1.2 Partnership Steering Committee

In accordance with the Memorandum of Understanding between the respective African universities and Universities Denmark, a Partnership Steering Committee shall be established at each of the participating African universities with the following tasks:

- Provide leadership for the joint capacity-building activities within BSU;
- Accept responsibility for the scientific and financial integrity of the collaboration, which includes taking final decisions on research courses organised and PhD and other grants given under the BSU initiative at the respective south university;
- Review the finances on an annual basis and ensure proper utilisation of funds;
- Ensure coherence and coordination across platforms.

The Partnership Steering Committee will consist of a chairman appointed by the Vice Chancellor of the university plus an equal number of members representing the African university and the Danish university sector. The chairpersons of the Danish Platform Steering Committees each appoint one member of the Partnership Steering Committee. The African university appoints a corresponding number of committee members. These members should include representations from the relevant Platform Working Groups.

5.1.3 Danish Platform Steering Committee

Universities Denmark has already established a Platform Steering Committee with members from all participating Danish Universities. The chairman of the committee is appointed by Universities Denmark. It is the task of this Steering Committee to ensure coordination between the Danish universities, to discuss progress of the initiative, to give recommendations on future activities and plans. The Platform Steering Committee will further decide on the annual budget allocations to individual universities in Denmark based on a draft budget provided by the Platform Secretariat. The Platform Steering Group will meet at least two times annually.

5.1.4 Platform Coordination Group

A Platform Coordination Group will be responsible for the general scientific management of the platform with particular reference to coordinating activities between the participating universities. The Platform Coordination Group will consist of the chairpersons of the Platform Working Groups and of the chairperson of BSUPEC. The group will be chaired by the chairperson of BSUPEC, which is appointed by the Danish Platform Steering Committee.

The Platform Coordination Group will meet every six months, either at physical meetings or as telephone/skype conferences to lower costs and increase efficiency. The organisation of the meetings will be done by the Platform Secretariat. Work and progress within the platform will be analysed at the meetings and the plan for the coming period updated accordingly. The members of the Platform Coordination Group will divide the tasks of leading the work packages among themselves. The assigned WP leaders will for each meeting present an overview of activities with the work package across all participating universities. This will be assisted by the Platform Secretariat.

5.2 Financial management and accounting

The financial management of the core funding provided by Danida will follow the General Conditions for Grants to Development Research Supported through Danida and in line with the Memorandum of Understanding between the south university and Universities Denmark. Details on this are available from the Danida Fellowship Centre (DFC).

The BSUPEC Secretariat and the respective African university will establish separate finance accounts to distinguish the funds from other grants. The BSUPEC Secretariat forwards a disbursement request to Universities Denmark on behalf of the platform covering the entire fiscal year. Any expenses administered by DFC will be deducted from this disbursement request.

The BSUPEC Secretariat disburses funds to the respective African universities in two annual installments. The first transfer of 50% will be made in January, and the second installment will be transferred in August, conditioned on receipt and approval of the annual accounts for the previous fiscal year.

The participating universities in Denmark will have their costs reimbursed by the BSUPEC Secretariat based on invoices, and the overhead costs follow the institutions that has incurred the costs. The participating Danish universities will be required on request by the BSUPEC Secretariat to document the matching co-financing in accordance with the co-financing budget agreed with Danida.

The African universities will submit the platform's accounts electronically for the previous fiscal year to the BSUPEC Secretariat no later than 1st May. The annual accounts must contain a scanned signature of the institution's relevant accounting officer. With this signature, the institution's accounting officer endorses that the annual accounts are true and accurate and in compliance with the conditions of the grant. The presentation of accounts and expenses must be distributed according to entries in the agreed budget, and with the same level of detail. The accounts must also contain a report on the amount of unused funds at the end of the year. Any interest earned must be declared separately, as this must be returned to Danida at the end of the phase.

The BSUPEC Secretariat prepares the full account of the platform and forwards it to the Secretariat of Universities Denmark no later than 1st June. A final audited set of accounts is submitted by African universities to the BSUPEC Secretariat latest six months after the completion of the two year phase. The set of final accounts must be audited by an independent certified auditor. The accounts must be accompanied by a statement of endorsement declaring that the audit has been carried out in accordance with the conditions presented here, as well as good public sector auditing practice.

5.3 Reporting

The BSUPEC Secretariat will compile a consolidated technical and financial annual report of the platform activities. The south universities must provide input to the annual report no later than 1st May in the following year. The processes of providing this input will be overlooked by the respective Platform Working Groups and by the Platform Coordination Group. The BSUPEC Secretariat forwards the consolidated annual report to Universities Denmark no later than 1 June on behalf of the platform. The annual report documents the platform activities and progress in relation to the objectives and outputs described in the activity plan and also described reasons for any deviations from the plan. The annual report will list all deliverables arising from the project, including publications, workshops, seminars, courses and contributions to MSc and PhD graduates. Finally the report will include an overview of the financial costs of the activities divided over the many activity types.

Annex 1: Budgets

The budget has been prepared generally using standard rates for activities and salaries agreed between the four BSU platforms.

The following tables are presented.
A1.1. Summary budget of core-funding for all three scenarios.
A1.2. Summary budget of in-kind-funding.
A1.3. Budget for WP1: Research education.
A1.4. Budget for WP2: Research networking.
A1.5. Budget for WP3: PhD project support.
A1.6. Budget for WP4: Knowledge sharing and dissemination.
A1.7. Budget for WP5: Platform coordination, management and governance.
A1.8. Standard rates.

Table A1.1. – Summary budget of Core-funding for all three scenarios.

CORE FUNDING BY DANIDA - 2 YEAR PERIOD	RATES				Scenario: 8 mill. DKR			Scenario: 14 mill. DKR			Scenario: 20 mill. DKR		
WP 1. RESEARCH EDUCATION	**Unit**	**Total unit cost**	**North**	**South**	**No of units**	**North**	**South**	**No of units**	**North**	**South**	**No of units**	**North**	**South**
PhD courses:													
A. PhD course generic, 1 week, 2,5 ECTS	1	114870	89870	25000	4	359480	100000	4	359480	100000	8	718960	200000
B. PhD course incl. lab/field experiments, 1 week, 2,5 ECTS	1	139870	89870	50000	4	359480	200000	8	718960	400000	8	718960	400000
PhD supervisory course*, 1 week	1	114870	89870	25000	4	359480	100000	4	359480	100000	4	359480	100000
WP 2. RESEARCH NETWORKING													
Coordinated research networks (15 participants)	1	927125	247825	679300	2	495650	1358600	4	991300	2717200	5	1239125	3396500
Short-term scientific missions (S-N, S-S):													
A. S visiting N, Aver. 1 month stay, incl course in north - budget for one visiting southern researcher	1	54500	0	54500	4	0	218000	8	0	436000	8	0	436000
B. S visiting S, Aver. 1 month stay - budget for one visiting southern researcher	1	21500	0	21500	8	0	172000	8	0	172000	8	0	172000
Writing scientific workshop at S*, 1 week	1	114870	89870	25000	4	359480	100000	4	359480	100000	5	449350	125000
Experimental areas - budget for two countries	1	330660	52280	278380	0	0	0	0	0	0	1	52280	278380
WP 3. PHD PROJECT SUPPORT													
PhD Scholarship - budget for one southern scholarship (2/3 of 3 year PhD)	1	393413	149580	243833	0	0	0	4	598320	975333	12	1794960	2926000
WP 4. KNOWLEDGE SHARING AND DISSEMINATION													
Website (N & S) - budget for two years	1	294800	254800	40000	1	254800	40000	1	254800	40000	1	254800	40000
International conference participation - budget for one southern participant (4 days stay)	1	19820		19820	4	0	79280	8	0	158560	4	0	79280
Seminar at S with stakeholder participation - budget for one seminar	1	50000		50000	4	0	200000	4	0	200000	4	0	200000
Seminar in Denmark with invited speakers (25 participants) - budget for one seminar	1	50000	50000		1	50000	0	1	50000	0	1	50000	0
WP 5. PLATFORM COORDINATION, MANAGEMENT AND GOVERNANCE													
Coordinator/Secretariat Denmark - budget for salary of one month	1	50000	50000		12	600000	0	24	1200000	0	24	1200000	0
Secretariat Denmark (running cost associated with travelling domestic) - budget for two years	1	50000	50000		1	50000	0	1	50000	0	1	50000	0
Coordinators at S at each university** - budget for one month for four S universities	1	40000		40000	24	0	960000	32	0	1280000	40	0	1600000

External audit south - budget for one university	1	15000		15000		4	0	60000		4	0	60000		4	0	60000
External audit north	1	15000	15000			1	15000	0		1	15000	0		1	15000	0
Platform steering committee + Platform Working Group:																
Northern participant (chairman) - budget for 2 meetings (for the 2 year period in 2 countries)	1	56100	56100			1	56100	0		1	56100	0		1	56100	0
Inception (North visiting south) - budget for 3 northern researchers	1	309720	309720			1	309720	0		1	309720	0		1	309720	0
Notes:						**Total excl. OH**	**3269190**	**3587880**		**Total excl. OH**	**5322640**	**6739093**		**Total excl. OH**	**7268735**	**10013160**
** Budgets of PhD supervisory course and Writing Workshop at S identical with the budget of PhD course generic*																
*** Coordinators at south to be supplemented by other BSU platform present at the same universities*						**OH**	**800000**	**280000**		**OH**	**1400000**	**490000**		**OH**	**2000000**	**700000**
						Total incl. OH	**4069190**	**3867880**		**Total incl. OH**	**6722640**	**7229093**		**Total incl. OH**	**9268735**	**10713160**
						Total (N+S)		**7937070**		**Total (N+S)**		**13951733**		**Total (N+S)**		**19981895**
						SURPLUS (N+S)		62930		SURPLUS (N+S)		48267		SURPLUS (N+S)		18105

Table A1.2. Summary budget of in-kind-funding.

IN-KIND FUNDING BY THE DANISH UNIVERSITIES - 2 YEAR PERIOD	RATES				Scenario: 8 mill. DKR				Scenario: 14 mill. DKR				Scenario: 20 mill. DKR	
WP 1. RESEARCH EDUCATION	**Unit**	**Unit total cost**			**No of units**	**North**			**No of units**	**North**			**No of units**	**North**
PhD courses														
A. PhD course generic/dry , 1 week, 2,5 ECTS	1	58000			4	232000			4	232000			8	464000
B. PhD course incl. lab/field, 1 week, 2,5 ECTS	1	58000			4	232000			8	464000			8	464000
PhD supervisory course	1	58000			4	232000			4	232000			4	232000
WP 2. RESEARCH NETWORKING														
Coordinated research networks (15 participants)	1	348000			2	696000			4	1392000			5	1740000
Short-term scientific missions (S-N, S-S):														
A. S visiting N, Aver. 1 month stay, incl course in north - budget for one visiting southern researcher	1	34500			4	138000			8	276000			8	276000
B. S visiting S, Aver. 1 month stay - budget for one visiting southern researcher														
Writing scientific workshop at S*, 1 week	1	58000			4	232000			4	232000			5	290000
Experimental areas - budget for two countries	1	116000			0	0			0	0			1	116000
WP 3. PHD PROJECT SUPPORT														
PhD Scholarship - budget for one southern scholarship (2/3 of 3 year PhD)	1	166000			0	0			4	664000			12	1992000
WP 4. KNOWLEDGE SHARING AND DISSEMINATION														
Website (N & S) - budget for two years	1	150000			1	150000			1	150000			1	150000
International conference participation - budget for one southern participant (4 days stay)														
Seminar at S with stakeholder participation - budget for one seminar														
Seminar in Denmark with invited speakers (25 participants) - budget for one seminar	1	50000			1	50000			1	50000			1	50000
WP 5. PLATFORM COORDINATION, MANAGEMENT AND GOVERNANCE														
Coordinator/Secretariat Denmark - budget for salary of one month	1	50000			12	600000			0	0			0	0
Secretariat Denmark (running cost) - budget for two years	1	100000			1	100000			2	200000			2.5	250000
*Coordinators at S at each university** - budget for one month for four S universities*														

External audit south - budget for one university														
External audit north														
Platform steering committee + Platform Working Group:														
Platform chairman - salary monthly	1	58000				6	348000			12	696000			12	696000
Platform steering committee in Denmark - budget for 6 members	1	348000				1	348000			2	696000			2	696000
Inception (North visiting south)* - budget for 3 northern researchers	1	348000				1	348000			1	348000			1	638000
**Note:* *Inception: each researcher working 3.5 months at the 20 mill. scenario*						**Total excl. OH**	**3706000**			**Total excl. OH**	**5632000**			**Total excl. OH**	**8054000**
						OH	**800000**			**OH**	**1400000**			**OH**	**2000000**
						Total incl. OH	**4506000**			**Total incl. OH**	**7032000**			**Total incl. OH**	**10054000**
						SURPLUS	506000			SURPLUS	32000			SURPLUS	54000

Table A1.3. Budget for WP1: Research education

WP 1. RESEARCH EDUCATION	Unit	Unit cost	No. of units	Cost total		North	South	Total N+S
CORE-FUNDING - PhD courses								
A. PhD course generic, 1 week, 2,5 ECTS								
Salary	Monthly salary	58000	1	58000		58000		
International travel	Air fare R/T	11000	1	11000		11000		
Local travel, visa and vaccinations	Lumpsum	7500	1	7500		7500		
Accommodation	Nightly rate	500	14	7000		7000		
Per diem	Daily rate	455	14	6370		6370		
Materials	Lumpsum	25000	1	25000			25000	
Total				114870		**89870**	**25000**	**114870**
B. PhD course incl. lab/field experiments, 1 week, 2,5 ECTS								
Salary	Monthly salary	58000	1	58000		58000		
International travel	Air fare R/T	11000	1	11000		11000		
Local travel, visa and vaccinations	Lumpsum	7500	1	7500		7500		
Accommodation	Nightly rate	500	14	7000		7000		
Per diem	Daily rate	455	14	6370		6370		
Materials	Lumpsum	50000	1	50000			50000	
Total				139870		**89870**	**50000**	**139870**
IN-KIND FUNDING - PhD courses								
Salary (one month pr course)	Monthly salary	58000	1	58000		58000		
Total				58000		**58000**		**58000**

Table A1.4. Budget for WP2: Research networking.

WP 2. RESEARCH NETWORKING	Unit	Unit cost	No. of units	Cost total		North	South	Total N+S
CORE-FUNDING - Coordinated research networks (CRN)*								
A.1. Workshop (15 participants)								
>> Southern participants - home country (6 persons)								
Local transport	Lump sum	2000	6	12000			12000	
Accommodation, 5 days	Daily rate	500	30	15000			15000	
Per diem, 5 days	Daily rate	455	30	13650			13650	
>> Southern participants - international travel (6 persons)								
International travel (South visiting South)	Lump sum	8000	6	48000			48000	
Accommodation, 5 days	Daily rate	500	30	15000			15000	
Per diem, 5 days	Daily rate	455	30	13650			13650	
Local transport, visa	Lump sum	2000	6	12000			12000	
>> Northern participants (3 persons)								
International travel	Lump sum	11000	3	33000		33000		
Accommodation, 5 days	Daily rate	500	15	7500		7500		
Per diem, 5 days	Daily rate	455	15	6825		6825		
Local transport, visa and vaccinations, DK staff	Lump sum	7500	3	22500		22500		
A.2. Workshop (facilities, lunch)								
Meeting and seminar	Lump sum	50000	1	50000			50000	
Total workshop				249125		69825	179300	249125
B. Leadership of CRN (PI south, Vice-PI north)								
PI South (2 months)	Monthly salary	10000	2	20000			20000	
Vice PI North (1 month)	Monthly salary	58000	1	58000		58000		
Total leadership				78000		58000	20000	78000
C. Research project support (15 participants)	Lump sum	600000	1	600000		120000	480000	
Total research support				600000		120000	480000	600000
Total for one CRN*				927125		**247825**	**679300**	**927125**
**Note: CRN including a 5-days workshop, leadership, funds for research support; 15 participants)*								
IN-KIND FUNDING - Coordinated research networks								

Salary (3 persons from north pr network)	Monthly salary	58000	3	174000		174000		
Salary of associated participants from north	Monthly salary	58000	3	174000		174000		
Total						**348000**		**348000**

WP 2. RESEARCH NETWORKING	**Unit**	**Unit cost**	**No. of units**	**Cost total**		**North**	**South**	**Total N+S**
CORE-FUNDING – Short-term scientific missions (S-N, S-S)								
A. S visiting N, Aver. 1 month stay - budget for 1 visiting S researcher								
International travel (South visiting North)	Lump sum	11000	1	11000			11000	
Monthly allowance + per diem rate (incl. accommodation) (South visiting North)	Monthly rate	11500	1	11500			11500	
Local transport, visa (South visiting North)	Lump sum	2000	1	2000			2000	
Course fee at a Danish University	Lump sum	30000	1	30000			30000	
Total				54500			**54500**	**54500**
B. S visiting S, Aver. 1 month stay - budget for 1 visiting S researcher								
International travel (South visiting South)	Lump sum	8000	1	8000			8000	
Monthly allowance + per diem rate (incl. accommodation)	Mountly rate	11500	1	11500			11500	
Local transport, visa (South visiting North)	Lump sum	2000	1	2000			2000	
Total				21500			**21500**	**21500**
IN-KIND FUNDING – Short-term scientific missions (S-N)								
Salary	Monthly salary	58000	0.25	14500		14500		
Bench fee	Lump sum	20000	1	20000		20000		
Total						**34500**		**34500**

WP 2. RESEARCH NETWORKING	Unit	Unit cost	No. of units	Cost total		North	South	Total N+S
CORE-FUNDING - Joint experimental areas*								
A.1. Workshop (14 participants pr country)								
>> Southern participants - (6 ps travelling to host university in home country)								
Local travel (Country 1)	Lump sum	2000	6	12000			12000	
Accommodation, 3 days (Country 1)	Daily rate	500	18	9000			9000	
Per diem, 3 days (Country 1)	Daily rate	455	18	8190			8190	
Local travel (Country 2)	Lump sum	2000	6	12000			12000	
Accommodation, 3 days (Country 2)	Daily rate	500	18	9000			9000	
Per diem, 3 days (Country 2)	Daily rate	455	18	8190			8190	
>> Northern participants (2 ps)								
International travel	Lump sum	11000	2	22000		22000		
Accommodation, 8 days (four days in each of the two countries)	Daily rate	500	16	8000		8000		
Per diem, 8 days (four days in each of the two countries)	Daily rate	455	16	7280		7280		
Local transport, visa and vaccinations, DK staff	Lump sum	7500	2	15000		15000		
A.2. Workshop expense (facilities, lunch)								
Meeting and seminar (two countries)	Lump sum	50000	2	100000			100000	
B. Collection and analysis of existing data of experiment area								
Salary (3 months pr. southern university)	Monthly salary	10000	12	120000			120000	
Total				330660		**52280**	**278380**	**330660**
**Notes:* *1) 2-day workshop in both S countries; 14 participants (12 from S, 2 from N)* *2) Expenses for travel and accommodation covered for 6 participants from S, as the remaining 6are expected to be living at the site of the WS.*								
IN-KIND FUNDING - Joint experimental area								
Salary (1 month pr WS participant)	Monthly salary	58000	2	116000		116000		
Total				116000		**116000**		**116000**

Table A1.5. Budget for WP3: PhD project support.

WP 3. PHD PROJECT SUPPORT	Unit	Unit cost	No. of units	Cost total		North	South	Total N+S
CORE-FUNDING - PhD Scholarship* - budget for one southern scholarship								
A. Supervision and examination								
Salary (Danish supervisor)	Monthly salary	58000	3	174000		174000		
International travel for supervisor and external examiner	Air fare R/T	11000	2	22000		22000		
Local travel, visa and vaccinations	Lumpsum	7500	2	15000		15000		
Accommodation	Nightly rate	500	14	7000		7000		
Per diem	Daily rate	455	14	6370		6370		
B. PhD student								
International travel (2 times stay in Denmark)	Air fare R/T	11000	2	22000			22000	
Per diem and accommodation (for 10 months stay in Denmark)	Monthly lump sum	11500	10	115000			115000	
Research costs/bench fees/computer/books/inscription fees	Annual lump sum	60000	3	180000			180000	
DFC administration fee (for 10 months stay in Denmark)	Monthly lump sum	1875	10	18750			18750	
Course fee	Lump sum	30000	1	30000			30000	
Total				590120		224370	365750	590120
2/3 PhD. covered the first two year				393413		**149580**	**243833**	**393413**
**Notes:* *1) Salary and other emoluments of PhD student expected to be covered by Southern partner* *2). The course fee is to cover courses etc while in Denmark. It may differ among the Danish universities*								
IN-KIND FUNDING - PhD Scholarship								
Salary (supervision)	Monthly salary	58000	2	116000		116000		
Bench fee (operational costs for two times stay in Denmark)	Lump sum	25000	2	50000		50000		
Total				166000		**166000**		**166000**

Table A1.6. Budget for WP4: Knowledge sharing and dissemination.

WP 4. KNOWLEDGE SHARING AND DISSEMINATION	Unit	Unit cost	No. of units	Cost total		North	South	Total N+S
CORE-FUNDING - Website								
Website updating at S*	Monthly salary	10000	4	40000			40000	
Webmastering, development and updating** (budget for two years)	Lump sum annually	126000	2	252000		252000		
Webhosting fee (NETSITE A/S) (budget for two years)	Yearly fee	1400	2	2800		2800		
Total				294800		**254800**	**40000**	**294800**
**Note: Salary at S Universities (½ month at each university annually - budget for two years)*								
***Note: Employee in Denmark to be shared with the Platform on Stability, Democracy and Rights*								
IN-KIND FUNDING - Website								
Salary (website)**	Monthly salary	50000	3	150000		150000		
Total				150000		**150000**		**150000**
**Note: Employee in Denmark to be shared with the Platform on Stability, Democracy and Rights*								
CORE-FUNDING - International conferences - budget for one S participant								
International travel	Lump sum	11000	1	11000			11000	
Per diem rate, daily rate, 4 days	Daily rate	455	4	1820			1820	
Accommodation, daily rate, 4 days	Daily rate	500	4	2000			2000	
Local transport, visa	Lump sum	2000	1	2000			2000	
Conference fee	Lump sum	3000	1	3000			3000	
Total				19820			**19820**	**19820**
CORE-FUNDING - Seminar in South with stakeholder participation								
Meeting and seminar	Lump sum	50000	1	50000			50000	
Total				50000			**50000**	**50000**
CORE-FUNDING - Seminar in Denmark with invited speakers								
Meeting and seminar	Lump sum	50000	1	50000		50000		
Total				50000		**50000**		**50000**
IN-KIND FUNDING - Seminar in Denmark with invited speakers								
Salary (participation, 25 participants)	Lump sum	50000	1	50000		50000		
Total				50000		**50000**		**50000**

Table A1.7. Budget for WP5: Platform coordination, management and governance.

WP 5. PLATFORM COORDINATION, MANAGEMENT AND GOVERNANCE	**Unit**	**Unit cost**	**No. of units**	**Cost total**		**North**	**South**	**Total N+S**
CORE-FUNDING - Coordinator/Secretariat Denmark								
Salary	Monthly salary	50000	1	50000		50000		
Total				50000		**50000**		**50000**
CORE-FUNDING - Secretariat Denmark								
Running cost associated with travelling domestic	Lump sum, yearly	25000	2	50000		50000		
Total				50000		**50000**		**50000**
IN-KIND FUNDING - Coordinator/Secretariat Denmark*								
Salary (N.B. only for the 8 mio scenario; 6 months annually)	Monthly salary	50000	12	600000		600000		
Total				600000		**600000**		**600000**
Note: Coordinator in Denmark funded part-time at the 8 mill. scenario and full-time at the 14 and 20 mill. scenario by DANIDA								
IN-KIND FUNDING - Secretariat Denmark								
Operational costs (Economic, PC, Secretary, Graphic, Office support etc.)	Lump sum	100000	1	100000		100000		
Total				100000		**100000**		**100000**
CORE-FUNDING - Coordinators at South* (at each university)								
Salary (south) (reporting, financing, newsletter contribution)	Monthly salary	10000	4	40000			40000	
Total				40000			**40000**	**40000**
Note: Budget for one month for the four universities and to be supplemented by the other BSU platforms present at the same universities								
CORE-FUNDING Platform steering committee + Platform working group								
Northern participant (chairman) - 2 meetings (for the 2 year period in 2 countries)								
International travel (one time each year for 1 person)	Air fare R/T	11000	2	22000		22000		
Local travel (domestic), visa and vaccinations (one time each year)	Lump sum	7500	2	15000		15000		
Accommodation (5 nights pr country each year for one person)	Nightly rate	500	20	10000		10000		
Per diem (diet etc) (5 days pr country each year for one person)	Daily rate	455	20	9100		9100		
Total				56100		**56100**		**56100**
IN-KIND FUNDING - Chairman of the platform*								
Chairman - salary (one month)	Monthly salary	58000	1	58000		58000		
Total						**58000**		**58000**
Note: Chairman working 3, 6 and 6 months yearly at the three different budget scenarios. Entirely funded by the Danish Universities								

IN-KIND FUNDING - Platform steering committee in Denmark*								
Steering committee members (6 persons)	Monthly salary	58000	6	348000		348000		
Total						**348000**		**348000**
Note: Steering committee working 1 month pr ps at the 8 mill. scenario, 2 month pr pr at the 14, 20 mill. scenario. Entirely funded by the Danish Universities								
CORE-FUNDING - Inception phase (North visiting South)*								
International travel (3 northern partners) (2 countries)	Air fare R/T	11000	3	33000		33000		
Local travel, visa and vaccinations	Lump sum	7500	3	22500		22500		
Accommodation (14 nights pr. country) (one week pr. university)	Nightly rate	500	84	42000		42000		
Per diem (diet etc)	Daily rate	455	84	38220		38220		
Salary (1 month pr. ps)	Monthly rate	58000	3	174000		174000		
Total				309720		**309720**		**309720**
Note: Budget for three northern researchers								
IN-KIND FUNDING - Inception phase (North visiting South)								
Salary (2 months for each of the three persons)*	Monthly rate	58000	6	348000		348000		
Total						**348000**		**348000**
Note: 2 months pr ps at the 8 and 14 mill. scenario; ca. 3.5 months pr ps at the 20 mill. scenario.								

Table A1.8. Standard rates used for budgeting.

STANDARD RATES (ACCORDING TO AGREEMENT BY ALL BSU PLATFORMS)	**Unit price DKR**		**Description**
SALARIES			
Monthly salary DK (North)	58000		Avg. monthly salary rate of senior academic staff in DK
Monthly salary DK (North)	50000		Avg. monthly salary rate of academic coordinator in DK
Monthly salary (South)	10000		Avg. Monthly salary rate of academic coordinator at South partner
NORTH VISITING SOUTH			
International travel (North visiting South)	11000		DFC rate, irrespective of travelling from north to south or vice versa
Local transport, visa, vaccinations (North visiting South)	7500		Lump sum for local travel, visa, vaccinations (per travel) for visiting Danish staff
Per diem rate, daily rate (North visiting South)	455		Per diem rate, DK staff visiting Ghana and Tanzania
Accommodation, daily rate	500		Avg. accommodation rate
SOUTH VISITING SOUTH			
International travel (South visiting South)	8000		
Local transport, visa (South visiting South)	2000		
Monthly allowance + per diem rate (incl. diet and accommodation)	11500		
SOUTH VISITING NORTH			
International travel (South visiting North)	11000		DFC rate, irrespective of travelling from north to south or vice versa
Monthly allowance + per diem rate (incl. accommodation) in DK (South visiting North)	11500		DFC rate
Local transport, visa	2000		
ACTIVITIES/PRODUCTS			
Meeting and seminar	50000		Lump sum for organization and implementation of meetings and seminars
Thematic working group in Denmark (NORTH)	15000		Lump sum in support of thematic working groups in Denmark
External audit	15000		Cost of external audit (estimated)
Bench fee - PhD. stay at Danish University pr year	25000		

Annex 2: CVs of key Danish university staff

A total of five CVs are enclosed. These CVs were selected to represent both the scientific research qualification and the capacity building competences. At the same time CVs were selected to represent a broad range of the research topics covered by BSUPEC as well as the key Danish universities.

The following CVs are presented on the following pages:

Research professor Jørgen E. Olesen, Aarhus University (chair of BSUPEC Danish Steering Committee from March 2011, leader of the BSUPEC task force on climate change).
Jørgen E. Olesen has a background in agronomy, but a broad interest in environmental and climate change issues. He has participated in many national and international research projects, also in developing countries. He has been involved as lead author for IPCC and contributed to several committees, including the Danish Commission on Climate Change Policy. He currently leads an initiative under FAO for defining and developing climate-smart agriculture.

Research professor Erik Jeppesen, Aarhus University (chair of BSUPEC Danish Steering Committee until March 2011, leader of the BSUPEC task force on water use and management).
Erik Jeppesen focuses on the biological structure and interactions with the nutrient dynamics and climate in lakes and streams, and he has an extensive research and publication record on these topics. He has performed field research on all continents except for Antarctica and on numerous islands in all climate zones, and he is currently intensively involved in research capacity building in China.

Professor Irini Angelidaki, Technical University of Denmark (contributor to the BSUPEC task force on energy and waste in urban and rural linkages)
Irini Angelidak works on various biomass conversion technologies, many of which are highly relevant for developing countries. She has participating in many national and international research projects on this subject and she has an extensive publication record.

Senior advisor Peter Furu, University of Copenhagen (chair of the BSUPEC task force on research methodologies)
Peter Furu has more than 27 years of working experience from 23 developing countries (Africa, South East Asia, Middle East, Central America) on international health with main emphasis on higher education/training, knowledge management, consultancies and research on topics within the areas of environmental health, health impact assessment, health related aspects of agricultural development and water resources development, health impacts of climate change, integrated schistosomiasis control and poverty and environmental health linkages.

Professor Arne Remmen, Aalborg University (chair of to the BSUPEC task force on sustainable innovations and planning)
Arne Remmen has extensive experience on research and capacity building within sustainable innovations and planning. The capacity building projects have been funded through both Danida and EU and covered Bangladesh, Thailand, Vietnam and Central America.

CURRICULUM VITAE for Jørgen E. Olesen, born 28.10.1958

Scientific degrees

M.Sc. in agriculture from Royal Veterinary and Agricultural University (KVL)

Scientific positions

1983-1986 Scientist, Danish Institute of Plant and Soil Science, Agrometeorological Service

1986-1991 Head of department, Danish Institute of Plant and Soil Science, Department of Agrometeorology

1991-1993 Scientist, Danish Institute of Plant and Soil Science, Department of Soil Science

1993-1994 Senior researcher, Danish Institute of Agricultural Sciences, Department of Crop Physiology and Soil Science

1994-2003 Head of research group on Crop Production, Department of Crop Physiology and Soil Science, Danish Institute of Agricultural Sciences

2003- Research professor in climate change and agriculture, Department of Agroecology and Environment, Aarhus University, Faculty of Agricultural Sciences

Research areas and activities

He was involved in initiating Danish research on agrometeorology. He has lead several interdisciplinary projects, including projects on integrated wheat production, application of remote sensing and GIS in agriculture, development of a whole-farm simulation model, and several projects on organic farming and reduced tillage. He has participated in eight EU projects and concerted actions on the effect of climate change on agriculture and on greenhouse gas emissions from agricultural activities. He is currently involved in three EU projects on climate change impacts, European nitrogen fluxes, mitigation of greenhouse gas emissions, and foresight analysis on European agriculture. He is project leader of two national research projects and participates in several other projects.

Member of the management committee of COST actions 729 and 734. He has participated in several governmental committees on reduction of greenhouse gas emissions from agriculture, integrated crop management, and reduced tillage practices. He has contributed in expert panels on the EU and for the World Bank (on climate change effects on rural poverty in Latin America). He has also contributed as an author to the third IPCC assessment report and as a lead author for the IPCC fourth assessment report, which received the Nobel Peace Prize in 2007. He was member of the Climate Commission under the Danish Ministry of Climate and Energy, and is currently member of the Danish Ethical Council.

Peer reviewer and evaluator of research proposals, research projects, research and educational programmes in Denmark, Norway, Sweden, UK, EU and ESF. Member of Editorial Board for European Journal of Agronomy, and referee for more than 20 different journals.

Invited speaker/participant at 22 international scientific meetings. Invited participant with oral contribution at numerous national meetings/seminars/workshops/hearings. Organizer of 11 international conferences/workshops/seminars. Currently teacher on two BSc courses and responsible for one MSc course (10 ECTS) under the Faculty of Agricultural Sciences at Aarhus University. Teacher on several PhD courses in Denmark, Norway, France and Spain. Currently supervisor for 5 PhD students and two Post Doc students. Organizer of research and management courses in Denmark and invited lectures in Denmark, UK, Germany, Uganda, France, Italy and USA. Several studies and stays abroad (2-10 weeks) in UK, Australia, New Zealand and Ghana. Author, editor and co-editor of 20 synthesis reports in areas such as climate change impacts, greenhouse gas emissions, non-inversion tillage, integrated crop management and organic farming.

Qualifications within environmental and climate change issues

He has a very broad experience on the interaction between agricultural (and agroecosystem) activities and the environment. This involves both the effect of agriculture on environment and the effect of environmental change on agroecosystems. He also has an extensive and broad network in Europe and elsewhere related to this. Some of the experiences also cover semi-managed ecosystems. These experiences include:

- Assessing impact of climate change on European agricultural systems and the interaction with other sectors as well, in particular with relation to water use and availability. Participation in 7 completed and/or ongoing EU projects or concerted actions on climate change impacts. Contributing author to the third IPCC WG-II assessment report, and lead author for the IPCC WG-II fourth assessment report with particular emphasis on European aspects. He has contributed to several national governmental and EU committees on analysis of impacts and adaptation to climate change.
- Impacts and adaptation to climate change in developing countries. He has participated in a research project on use of seasonal weather forecasting for improving adaptation to climatic variability in Ghana, and he has conducted a survey of climate change impacts and adaptation for rural livelihoods in Latin America. He currently leads an FAO initiative on defining climate-smart agriculture.
- Quantification of greenhouse gas emissions from agriculture and possible mitigation options, including both experimental and modelling studies of carbon and nitrogen fluxes in agricultural systems. The analyses have also included evaluation of new technologies for reducing greenhouse gas emissions, as well as quantification of cost-effectiveness of measures and technologies. This also includes quantifying biomass resources for bioenergy production and the environmental impacts related to their production. He has contributed to and chaired several national governmental committees on mitigation of greenhouse gas emissions from agriculture.
- Development and application of farm and landscape models for quantifying nitrogen flows and losses and resulting emissions of nitrate, ammonia and greenhouse gases to the environment. The models have been developed for analysing effectiveness of various measures for reducing emissions, for analysing problems with "pollution swapping" and evaluation of the cost-effectiveness of applying various new measures and technologies. He has led several national projects on model-based analyses and contributed in EU-projects, where these tools have been applied.
- Development and application of mathematical modelling for studying interactions among species in agroecosystems. This has been used to assess effects of changes in management practices and environmental conditions for biodiversity in agricultural fields and landscapes. The work has been conducted in collaboration with universities and research institutes, primarily in Denmark.
- Experimental and modelling studies on interaction between crops, pests, diseases and weeds, with an emphasis on reducing pesticide consumption. The results have been used to improve cultural methods for reducing pesticide consumption in Denmark, and ongoing work includes applying the new knowledge and models together with novel sensor technology for precision application of fungicides to cereals.
- He has been very active within the analysis of environmental impacts of organic farming systems, and he has also be actively involved in further developing organic farming practices, primarily through leading several national interdisciplinary projects on the subject involving both experimental and model-based methods.

Publications

He has published 113 papers in international scientific journals and books with peer review, 199 papers at conferences and 82 in reports, and 125 in technical letters and popular science papers. The peer reviewed journal papers have been cited 1553 times (ISI) giving a h-index of 20.

CURRICULUM VITAE for Erik Jeppesen, born 28.04.1951

Private address: Gravmosevej, 23, 8600 Silkeborg, Denmark
Phone: +45 86837449; ej@dmu.dk;

Work address: National Environmental Research Institute, Aarhus University, Dept. of Freshwater Ecology, Vejlsøvej 25, 8600 Silkeborg, Denmark and Dept. Biological Sciences, Aarhus University, Ole Worms Allé, Building 1135, 8000 Aarhus C, Denmark:
Phone: +45 89201400; Fax: +45 89201414, E-mail: ej@dmu.dk

EDUCATION: Cand scient in Biology (MSc), University of Copenhagen, Denmark, 1978; Dr Scient.in Biology (DSc), University of Copenhagen, Denmark, 1998

PROFESSIONAL CAREER: April 2002-Research professor on shallow lakes' ecology in a joint position at NERI and Biological Institute, Aarhus University ;April 2005-2009-Adjunct professor at the Chinese Academy of Sciences, Wuhan, China; October 2009-2012-Guest professor at the Chinese Academy of Sciences, Nanjing, China.

MAJOR RESEARCH INTEREST: Aquatic ecology with special emphasis on the biological structure and interactions with the nutrient dynamics and climate in lakes and streams. Catchments scale studies, ecosystem restoration, lake-re-establishment, freshwater biodiversity, palaeoecology and catchment and ecosystem modelling are other major research fields. Has performed field research on all continents except for Antarctica and on numerous islands in all climate zones.

RECENT RELEVANT PROJECT LEADERSHIP:

- Managed the Nordic project *Cross-system analysis of the variation in biological structure and dynamics of North Atlantic lakes related to variations and changes in climate and land use* (5 mill DKK, 2000-2005).
- Member of the management board of the Danish 24 mill DKK STF project *Consequences of weather and climate changes for marine and freshwater ecosystems*, (5 mill DKK, 2001-2006).
- Member of the executive committee and WP leader of the 120 mill DKK EU FP6 project EUROLIMPACS (6 mill DKK, 2004-2009) on the effects of climate changes on freshwaters.
- WP leader of the 50 mill DKK EU FP7 project WISER dealing with (3 mill DKK, 2009-2011)
- Member of the excutive committee and WP leader and of the 50 mill DKK European climate change effect project REFRESH (5 mill DKK, 2010-2013).
- Co-leader of SALGA (*South American Lake Gradient Analyses*), a comprehensive comparative study of biological interactions and biodiversity in shallow lakes from northern Brazil to the Tierra del Fuego (2005-2010).
- Leader of an intensive comparative study of lakes and streams in Uruguay and Denmark supported by the Research Council for Nature and Universe, FNU (Major Grant) (3.5 mill DKK, 2009-2012).
- WP leader and member of the streering committee of the 29 mill DKK Danish Climate Centre project CRES (4.5 mill DKK, 2009-2013)

- Co-leader on the project “Effect of climate change on terrestrial and aguatic ecosystems in the Arctic” at the Climate Centre in Greenland (6 mill DKK, 2009-2014).
- Co-operates at present with more than 60 groups in North and South America, Europe, Greenland, Iceland, the Faroe Islands, Turkey, China, New Zealand, Australia and South Africa.
- Initiator of the inter-university platform “Water and Environment” at the Sino-Danish University Centre”, and now PI of this theme at the Centre.
- Initiator of and leader during early prepapration phase of the theme “Environment and Climate” of the Danish University initiative – “Building stronger universities in developing countries”.

SCIENTIFIC PAPERS AND THEIR IMPACT: >200 international publications in refereed journals and book chapters since 1990; >100 reports and papers in Danish; > 100 invited speeches at international conferences (21 in 2009-10), including South Africa and Ethiopia. Is one of the most cited freshwater ecologists in the world in 2010 (1028 times in 2010). His H-index is 44. Co-author of chapters in the key climate assessments: IPCC 2007 and the ACIA (Arctic Climate Impact Assessment) 2005.

AWARDS: Member of the IPCC2007 panel that received the Nobel Peace Award 2007. Received the prestigious Naumann-Thienemann medal from SIL (International Society of Limnology) in 2010 for outstanding research in limnology (highest award in the field). Nominated (among 5) for the ECI-prize “Excellence in Ecology” in 2003. Nominated for the Chinese “Einstein Award” 2008 and 2009.

TEACHING/SUPERVISION: Teaching post graduate courses in limnology and, system analyses at Aarhus university. Heading numerous PhD and master courses at University of Aarhus, Sweden, Turkey, Brazil, Uruguay, Argentina and China in recent years. Supervisor or co-supervisor of > 70 MSc theses and 22 PhD theses, including nine from abroad. At present supervisor for 6 Post Docs from abroad, 5 PhD students (2 from abroad), and 5 MSc students (3 from abroad).

REVIEWER: Reviewer for >40 journals; US NSF; German DFG; Swedish Research Councils (board member of *Formas* for two years); Research Council, UK. In the editorial board of *Ecosystems* since 1997, the advisory board of *Aquatic Health and Management* since 2001, the advisory board of Journal *Hydrobiologia* since 2007, the editorial board of *Freshwater Biology* since 2008 and the editorial board of *The Journal of Lake Sciences* since 2009 and of *Inland Waters* since 2010.

ANGELIDAKI, Irini

Personal data:

Name : Irini Angelidaki
Position : Professor
Affiliation : Dept. of Environmental Engineering, Technical University of Denmark – DTU

Research experience:

Biogas, biological production of hydrogen; microbial fuel cells; biorefineries; bioethanol; development of physical, chemical, enzymatic and microbiological methods for degradation of lignocellulosic material; microbial degradation of xenobiotic pollutants; isolation and characterization of bacteria; anaerobic microbiology and anaerobic processes; mathematical models for simulation of the anaerobic process; and monitoring and control of the biological processes.

Organizational experience:

Project management: Have extensive experience in project management and have coordinated/participated in a large number of EU projects, such as Bioenergy Forum Øresund (Interreg III and Interreg IV), BIOWASTE (FP5), PIGMAN (FP6), and AQUATTERE (FP7) ModelProbe (FP7). National funds from Danish Research Council, PSO, companies etc.

M**ember of various international task groups** (member of the board of AD-group under IWA); chair in harmonization group for anaerobic biodegradability (IWA), member of the TG for anaerobic modeling (IWA).

Member of Nordic/Danish groups: Board for the Nordic program "Top Research Initiative- program"; member of the Danish Free Research Council committee for "Research technology and production" (FTP).

Patents:

- PA 2005 00927/US60/694,665 Schmidt, JE; Batstone, DJ; Christensen, N; Angelidaki, I; Trably, E. (2005). Anaerobic bacteria degrading Phthalates
- PCT/DJ2008/050060 Angelidaki I. Min B. (2006). Submersible microbial fuel cell.
- Angelidaki I. Tomas F and Karakashev D. (2010). Patent filing for "A new extreme thermophilic ethanologen" for utilisation of pentoses to ethanol.

Publications activity: Approx. 300 scientific publications (110 ISI; 12 book chapters, 3 patents), since 1991; H-factor 26.

Selected recent ISI publications

1. Lu X., Zhang Y., and Angelidaki (2009). Optimization of H_2SO_4-catalyzed hydrothermal pretreatment of rapeseed straw for bioconversion to ethanol: pretreatment at high solids content. *Bioresource Technol.* 100(23)3048-3053.
2. Kaparaju P., Serrano M., Thomsen A.B., Kongjan P., and Angelidaki I. (2009). Bioethanol, biohydrogen and biogas production from wheat straw in a biorefinery concept. *Bioresource Technol.* 100(9): 2562–2568
3. Karakashev D., Kotay S.M., Trably E. and Angelidaki I. (2009). A strict anaerobic extreme thermophilic hydrogen-producing culture enriched from digested household waste. *J. Appl. Microbiol*. (106)(3):1041-1049.
4. Zhang Y., Min B., Huang L, and Angelidaki I. (2009). Electricity generation and microbial community analysis of wheat straw biomass powered microbial fuel cells. *Appl. Environ. Microbiol.* 75(11): 3389–3395.
5. Talebnia F., Karakashev D., and Angelidaki I. (2010). Bioethanol production from wheat straw: overview on pretreatment, hydrolysis and fermentation. *Bioresource Technol*. 101:4744–4753.
6. Bruni E, Jensen AP, Angelidaki I. (2010) Comparative study of mechanical, hydrothermal, chemical and enzymatic treatments of biofibers to improve biogas production. *Bioresource Technol.* 101 (22):8713-8717.
7. Kongjan P., Angelidaki I. (2010). Extreme thermophilic biohydrogen production from wheat straw hydrolysate using mixed culture fermentation: Effect of reactor configuration. *Biotechnol. Bioeng.* 101(20): 7789-7796.
8. Abreu A.A., Alves J.A., Pereira M.A., Alves M.M., Angelidaki I. (2010) Engineered heat treated methanogenic granules: A promising biotechnological approach for extreme thermophilic biohydrogen production. *Bioresource Technol.* :101(24): 9577-9586
9. Boe K., Steyer J.P., Batstone D., and Angelidaki I. (2010). State indicators for monitoring the anaerobic digestion process. *Wat Research* 44, 5973-5980.
10. Luo G., Talebnia F., Karakashev D. and Angelidaki I. (2011). Enhanced bioenergy recovery from rapeseed plant in a biorefinery concept. *Bioresource Technol.* 102:1433–1439.

CURRICULUM VITAE for Peter Furu, born 3.11.1954

Born: *3 November 1954*

Nationality: *Danish*

DBL – Centre for Health Research and Development
Department of Veterinary Disease Biology
Faculty of Life Sciences, University of Copenhagen
Thorvaldsensvej 57
DK-1871 Frederiksberg C
Denmark
Phone.: +45 3533 1430
Fax: +45 3533 1433
E-mail:pfu@life.ku.dk

Educational background:

- Master of Public Health (MPH) (120 ECTS credits), Nordic School of Public Health, Göteborg, Sweden, 2003
- Diploma of Public Health (DPH), Nordic School of Public Health, Göteborg, Sweden. 1997
- Master of Science (MSc) (Cand.scient. in Zoology (Parasitology)), University of Copenhagen, Denmark, 1984

Employment record:

- Senior Adviser, Environmental Health and Health Impact Assessment, DBL-Centre for Health Research and Development, Faculty of Life Sciences, University of Copenhagen, Denmark (since 1984 (DBL was formerly the Danish Bilharziais Laboratory))
- Head – WHO Collaborating Centre for Health and Environment in Sustainable Development at DBL (since 2001)
- Guest Lecturer at University of Aalborg, Denmark (since 2003) and University of Southern Denmark (since 2006)
- Appointed External Examiner (censor) in "International Health" at University of Copenhagen and University of Southern Denmark by the Danish Ministry of Science and Technology (since 2002)

Other scientific/technical qualifications:

Peter Furu has more than 27 years of working experience from 23 developing countries (Africa, South East Asia, Middle East, Central America) on international health with main emphasis on higher education/training, knowledge management, consultancies and research on topics within the areas of environmental health, health impact assessment (HIA), health related aspects of agricultural development and water resources development, health impacts of climate change, integrated schistosomiasis control and poverty and environmental health linkages.

Capacity building / Teaching

- ✓ PF has been organizer and Course Director of more than 20 training courses in Africa and South East Asia and Denmark; Main focus has been on research management issues, health impact assessment and schistosomiasis control.
- ✓ PF has taught > ten courses on "Research methodology" in Denmark and Africa with emphasis on research proposal development, research objective development and knowledge management.
- ✓ PF has taught more than 50 courses on aspects of climate change and health, environmental health, vector borne diseases, and health impact assessment (HIA) mostly at the level of government authorities in developing countries and at universities in Denmark and abroad. A comprehensive capacity development initiative on HIA covering Lao PDR, Vietnam and Cambodia is currently being implemented. It includes training courses, e-learning course development, policy formulations and development of technical guidelines.
- ✓ PF has comprehensive teaching experience and research supervision at Danish and international universities including supervision of 24 Master and PhD students.

Knowledge Management and Research

- ✓ PF has comprehensive management experience and currently has a number of management functions – e.g. as Head of WHO Collaborating Centre, Work Package leader in an FP6 Coordination Action (EUWI-ERA-NET (SPLASH)) and in ongoing research project in Vietnam (Climate change and Health) .
- ✓ PF has participated in more than 70 national and international workshops and conferences (international health, environmental health, health impact assessment, water) many as oral presenter, chairperson, organizer, key-note speaker and panel member.
- ✓ Participated in a number of consultancies for e.g. Danida, World Bank, World Health Organization. Member of a number of professional societies including the International Association for Impact Assessment; the International Association for Ecology and Health; the Danish Development Research Network; the Danish Water Forum and the Research Network on International Health. Member of the Climate Panel of the Faculty of Life Sciences, University of Copenhagen and the expert panel of University of Copenhagen (climate change and health). Referee at several scientific, international journals.
- ✓ Author or co-author of a total of 137 publications (including books, book chapters, scientific reports, abstracts, peer-reviewed papers)

CURRICULUM VITAE for Arne Remmen, born February 1954

Professional background

2002 - Professor, Technology, Environment and Society, Aalborg University (AAU)
2001-2008 Head of Department, Department of Development and Planning, AAU
1991-2002 Associate professor in technology assessment and planning, AAU
1986-1990 Ph.D. student and assistant professor at AUC
1985-1986 Civil servant at the Ministry of Environment
1980-1985 Assistant professor at AUC and Research assistant at Denmark's Technical University

Education

1990 Ph.D. in Constructive Technology Assessment, Faculty of Engineering and Science, AAU
1983 B.A in Psychology, AUC
1980 M.A in Social Science, AUC

Research

Written more than 150 articles and papers in journals and books, within these research fields:

- Environmental management and sustainability
- Product life cycle management and value chains
- Eco-design, eco-innovation and clean tech development
- Environmental and energy planning
- Governance and environmental policy (Integrated product policies in EU)
-

Recent research projects and research management experience:

2011 - Innovative partnerships in renewable energy for developing countries
2010 - Carbon 20 – climate mitigation in municipalities
2010 - INSPIRE – energy retrofitting of existing buildings
2010 - Sustainable transitions towards a low carbon economy
2010 - Clean Enterprise of the Future
2009 - PRINCIP – planning for 100% renewable energy
2008 - 2011 Access2innovation (innovation in development aid)
2008 - 2011 Potentials and limitations of the EU directive on Energy-using Products
2008 - 2010 Green networks – experience with public-private partnerships
2006 - 2008 Green Markets and Cleaner Technologies (Nordic Council)
2005 - 2008 Facilitating Sustainable Innovations (EU Interreg. Programme)
2003 - 2006 Environmental Communication and Collaboration in the Product Chain (CEMIP)
1996 - 2005 Sustainable Development Strategies for Central America (SUDESCA)

I am/have been AAU project leader on all the above projects. During the 1990's, I was the overall project manager on more than 10 research projects and took part in several others. Besides, I have been supervisor on 10 completed Ph.D. projects, on 3 Ph.D. theses finishing this year, and on 6 newly funded phd projects.

Capacity building at universities in developing countries

- Mobility for Life (ERASMUS) 2008- 2010. Courses for teachers and phd students from Bangladesh University of Engineering and Technology (BUET) and for Mah Fah Lung University in Thailand
- Can Tho University, Vietnam 2001-2004. Teaching master students and researchers (CAULES)
- SUDESCA - SUstainable DEvelopment Strategies for Central America. ENRECA project 1995-2005 on enhancing research capacity at 3 universities including several phd students