

Eurasia Programme - Call for proposals 2015

Application

Project identification

Project number CPEA-2015/10036

Project title

Water Harmony - Integration of Education, Research, Innovation and Entrepreneurship (Water Harmony-II)

A - Information on the partnership

A.1 Main partner institution in Norway

Main partner institution in Norway (liN)

Norwegian University of Life Sciences (NO-NMBU)

Department (liN)

Department: Department of mathematical sciences and technology

Head of department (liN)

Name: Rolstad Denby, Cecilie
Email: cecilie.rolstad.denby@nmbu.no
Phone number: +4767231523

Project coordinator (liN)

Name: Ratnaweera, Harsha
Gender: Male
Email: harsha.ratnaweera@nmbu.no
Phone number: +4798227777

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- * [CV-Harsha Ratnaweera.pdf](#)
- * [IoN Letter of Commitment-WH-II.pdf](#)

A.2 Main partner institution outside Norway

Main partner institution outside Norway (IoN)

Ukrainian State University of Chemical Technology (UA-SHEI USUCE)

Department (IoN)

Department: Department of Inorganic Substances Technology and Ecology

Head of department (IoN)

Name: Pivovarov, Oleksandr
Gender: Male
E-mail: ugutu@dicht.dp.ua
Phone number: +380 56 247 34 47

Project coordinator (IoN)

Name: Smotraiev, Roman
Gender: Male
Email: smotr00@gmail.com
Phone number: +380 98 430 36 25

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Letter of commitment

Letter of commitment

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* [IoN Letter of Commitment-WH-II.pdf](#)

A.3

Network partners

Institution:	UA-National Technical University of Ukraine - "Kyiv Polytechnic Institute" (UA-NTUU KPI)
Unit:	Faculty of Chemical Technology
Contact person:	Astrelin, Ihor
Gender:	Male
Degree:	DSc
Position:	Dean, Professor
E-mail:	i.m.astrelin@xtf.kpi.ua
Phone number:	+380 44 236 97 74
Institution:	UA-Cherkassy State Technological University (UA-CHDTU)
Unit:	Department of Chemistry and Chemical Technology of Inorganic Substances
Contact person:	Stolyarenko, Hennadiy
Gender:	Male
Degree:	DSc
Position:	Head of Department, Professor
E-mail:	ozon_gs@rambler.ru
Phone number:	+380 47 273 02 21
Institution:	BY-Belarusian State Technological University (BY)
Unit:	Dept of Industrial Ecology
Contact person:	Martsul, Uladzimir
Gender:	Male
Degree:	PhD
Position:	Head of Department of industrial Ecology, Associate Professor
E-mail:	umartsul@gmail.com
Phone number:	+37 529 273 29 19
Institution:	MD-Technical University of Moldova (TUM) (MD)
Unit:	Department of Ecotechnic, Enviromental Management and Water Engineering
Contact person:	Ionet, Ion
Gender:	Male
Degree:	PhD
Position:	Head of Department, Associate Professor
E-mail:	ionionet@rambler.ru
Phone number:	+37 37 955 60 57
Institution:	KZ-South-Kazakhstan State University (KZ)
Unit:	Department of Inorganic Substances Technology
Contact person:	Zhekeyev, Malik
Gender:	Male
Degree:	DSc
Position:	Head of Department, Professor
E-mail:	malikzhekeyev@mail.ru
Phone number:	+7 777 320 47 67

Institution: TJ-Tajik Technical University (TJ)
Unit: Department of Water Supply and Sanitation
Contact person: Azizov, Rustam
Gender: Male
Degree: DSc
Position: Professor at Material Science department
E-mail: rustam.azizov57@gmail.com
Phone number: +992 91 864 47 98

Institution: KG-Kyrgyz National University (KG)
Unit: Department of Inorganic Chemistry and Chemical Technology
Contact person: Sarymzakova, Roza
Gender: Female
Degree: DSc
Position: Professor
E-mail: sarimzakova@mail.ru
Phone number: +996 77 002 02 45

Institution: TJ-Mining-metallurgical Institute of Tajikistan (TJ)
Unit: Department of Ecology
Contact person: Razykov, Zafar
Gender: Male
Degree: DSc
Position: Vice-Rector for research and international relations, Professor
E-mail: zafarrazykov@mail.ru
Phone number: +992 92 777 44 33

A.4

Participants in the project

Name: Adamkulova, Chinara
Gender: Female
Degree: PhD
Position: Rector, Associate Professor
Institution: KG-Kyrgyz National University

Name: Baidinov, Turatbek
Gender: Male
Degree: PhD
Position: Professor, Associate Professor
Institution: KG-Kyrgyz National University

Name: Bostan, Ion
Gender: Male
Degree: DSc
Position: Rector, Academician
Institution: MD-Technical University of Moldova (TUM)

Name: Calos, Serghei
Gender: Male
Degree: PhD
Position: Associate Professor
Institution: MD-Technical University of Moldova (TUM)

Name: Ciobanu, Natalia
Gender: Female

Degree:	PhD
Position:	Lecturer
Institution:	MD-Technical University of Moldova (TUM)
Name:	Dormeshkin, Oleg
Gender:	Male
Degree:	DSc
Position:	Vice-Rector, Professor
Institution:	BY-Belarusian State Technological University
Name:	Dubina, Alexandr
Gender:	Male
Degree:	MSC
Position:	Assistant
Institution:	BY-Belarusian State Technological University
Name:	Efimova, Irina
Gender:	Female
Degree:	PhD
Position:	Head of Department
Institution:	KZ-South-Kazakhstan State University
Name:	Fedenko, Yuriy
Gender:	Male
Degree:	PhD
Position:	Assistant
Institution:	UA-National Technical University of Ukraine - "Kyiv Polytechnic Institute"
Name:	Fomina, Nataliia
Gender:	Female
Degree:	-
Position:	Chief of Ecological Laboratory
Institution:	UA-Cherkassy State Technological University
Name:	Gevod, Viktor
Gender:	Male
Degree:	DSc
Position:	Associate Professor
Institution:	UA-Ukrainian State University of Chemical Technology
Name:	Gruzdieva, Olena
Gender:	Female
Degree:	PhD
Position:	Associate Professor
Institution:	UA-Ukrainian State University of Chemical Technology
Name:	Hromyko, Andrei
Gender:	Male
Degree:	PhD
Position:	Associate Professor
Institution:	UA-Cherkassy State Technological University
Name:	Isac, Elena
Gender:	Female
Degree:	-
Position:	Assistant
Institution:	MD-Technical University of Moldova (TUM)

Name:	Kadirbaeva, Almagul
Gender:	Female
Degree:	PhD
Position:	Associate Professor
Institution:	KZ-South-Kazakhstan State University
Name:	Khojiboev, Daler
Gender:	Male
Degree:	-
Position:	Teacher, Postgraduate
Institution:	TJ-Mining-metallurgical Institute of Tajikistan
Name:	Kosogina, Iryna
Gender:	Female
Degree:	PhD
Position:	Associate Professor
Institution:	UA-National Technical University of Ukraine - "Kyiv Polytechnic Institute"
Name:	Kulakova, Lyudmila
Gender:	Female
Degree:	MSc
Position:	Head of Department
Institution:	KZ-South-Kazakhstan State University
Name:	Liavontiev, Viktor
Gender:	Male
Degree:	PhD
Position:	Head of Department of Biotechnology, Associate Professor
Institution:	BY-Belarusian State Technological University
Name:	Markevich, Raisa
Gender:	Female
Degree:	PhD
Position:	Associate Professor
Institution:	BY-Belarusian State Technological University
Name:	Normatov, Abdurakhmon
Gender:	Male
Degree:	PhD
Position:	Associate Professor
Institution:	TJ-Tajik Technical University
Name:	Radzhabova, Zarina
Gender:	Female
Degree:	PhD
Position:	Head of department, Associate Professor
Institution:	TJ-Tajik Technical University
Name:	Sanginova, Olga
Gender:	Female
Degree:	PhD
Position:	Deputy Dean on Academic Affairs, Associate Professor
Institution:	UA-National Technical University of Ukraine - "Kyiv Polytechnic Institute"
Name:	Sikhynbayeva, Zhamilya
Gender:	Female
Degree:	PhD

Position:	Associate Professor
Institution:	KZ-South-Kazakhstan State University
Name:	Skyba, Marharyta
Gender:	Female
Degree:	PhD
Position:	Assistant
Institution:	UA-Ukrainian State University of Chemical Technology
Name:	Solodovnik, Tetyana
Gender:	Female
Degree:	PhD
Position:	Associate Professor
Institution:	UA-Cherkassy State Technological University
Name:	Sorochkina, Kateryna
Gender:	Female
Degree:	MSc
Position:	Assistant
Institution:	UA-Ukrainian State University of Chemical Technology
Name:	Tolstopalova, Nataliia
Gender:	Female
Degree:	PhD
Position:	Head of Department, Associate Professor
Institution:	UA-National Technical University of Ukraine - "Kyiv Polytechnic Institute"
Name:	Ungureanu, Dumitru
Gender:	Male
Degree:	PhD
Position:	Professor
Institution:	MD-Technical University of Moldova (TUM)
Name:	Vorobiov, Artem
Gender:	Male
Degree:	PhD
Position:	Senior Lecturer
Institution:	BY-Belarusian State Technological University
Name:	Yunusov, Muzafar
Gender:	Male
Degree:	DSc
Position:	Chairman of Ecology department, Professor
Institution:	TJ-Mining-metallurgical Institute of Tajikistan

B - Information on the project

B.1 Description of the project

Project goals, activities and expected results

B.1.1 Please state the overall project goals

The project aims to develop and expand the Water Harmony initiative started during the previous phase, based on lessons learned, to new areas with more partners:

Overall project goals:

Goal 1: Strengthening and expansion of institutional partnerships between NMBU and nine universities in six partner countries through academic collaboration

Goal 2: Development of existing graduate programs towards more research, innovation, entrepreneurship and labor market orientation, through partnerships with public and private sectors

Goal 3: Increase international orientation of study programs and competence of supervisors through academic partnerships and student-staff mobility between the partner countries and Norway

Goal 4: Dissemination of the revitalized curricula, teaching tools and concepts to other universities associated with the partner universities, and to other resource persons and entities

Partnerships with public and private organizations will be strengthened through their involvement in curricula improvement, joint supervision, internships and innovative research. Furthermore, the collaborations will contribute to the basis of political and economic reforms in the partner countries (which are countries with transition economies), through reorientation of universities to market-based education. More awareness, interest, knowledge and enthusiasm at the Norwegian partner and among Norwegian students are anticipated through mobility programs (including externally funded), guest lectures and seminars.

The consortia of partners consists with partners that are both stronger and less strong in selected areas and functionalities. The stronger partners will provide a supplemental strengthening resource to NMBU in coordination. This also brings-in region-specific dimensions such as assistance from neighbouring universities, and increases the sustainability of the network.

B.1.2 Please outline in brief a work plan for the project and describe how the activities will contribute to the achievement of the project goals

The project is organized in such a way that a large number of teaching staff (over 40), students (over 100) and resource persons (over 30) from public and private organizations will be physically meeting each other at the universities of the consortia. Although it is a logistical challenge to bring together so many people, the positive experiences, results and impacts from the Water Harmony 2011-2014 project with eight partners make us confident in achieving this project's challenges as well.

The project is structured with 15 activities covering most of the objectives in the Eurasia Call to various degrees. The project activities are carried out through 8 project meetings, short and long term student mobility programs to Norway, involvement of external partners through workshops and student mobility placements and between partners as well as divided work carried out at partner universities.

Several of the 15 activities will be addressed during each project meeting, according to schedules. Dedicated sessions at the workshops and training meetings alongside intermediary work conducted at the home universities shall ensure the timely and efficient achievement of these targets. The distribution of responsibilities among all partners of the consortia, based on previous lessons learned, shall ensure a coordinated Team-effort in achieving goals in time.

Goal 1: strengthening of institutional partnerships will be achieved through networking, interactions, workshops, inter-partner supervision, research etc.

Goal 2: improvement of graduate programs achieved through sharing of best practices among partners as well as dialogues and job fairs/"career days" with future employers, and the iterative process of improvement through student and staff evaluations of the project results.

Goal 3: increased internationalization will be achieved through the large number of student-staff mobility's across countries, and joint research, lectures and publications.

Goal 4: dissemination will be achieved through a more active and quality-oriented publishing culture, as well as the involvement of associate partners from the public and private sector and associated universities.

Milestones: Eight international project meetings (physical) and twelve Skype/Lync meetings, development of five courses, holding student mobility programs, launching of online courses and holding online lectures, publishing an upgraded textbook in seven languages, guidelines, strengthened labs, joint teaching and supervision, student placements, are examples.

The eight physical meetings are scheduled for Dnepropetrovsk (03/2016, Kick-off); Oslo (10/2016); Cherkassy & Kiev (03/2017); Dushanbe & Khojand (10/2017); Chisinau (03/2018); Bishkek & Shymkent (10/2018); Minsk (03/2019) and Kiev & Dnepropetrovsk (11/2019, Final).

B.1.3 Please describe what concrete results are expected to be achieved through successful implementation of the project

Short-term results:

- Eight project meetings with 20-30 participants representing 10 universities in Dnepropetrovsk, Shymkent, Kiev, Oslo, Dushanbe, Khojand, Bishkek, Minsk, Cherkassy, Chisinau (Three meetings are combined for rational use of resources).
- 10 one-day workshops open for external partners and students in 10 cities, back-to-back with project meetings.
- Four batches of 20 master students with three weeks intensive courses in NMBU
- 11 master students from Ukraine in Norway for one year research fellowships (funded with Erasmus+)
- Six master students from Norway to Ukraine for five months for research fellowship evaluating project results, (funded with Erasmus+)
- Six staff members from Ukraine to Norway and six from Norway to Ukraine for one week training courses (funded with Erasmus+)
- One text book on water management & treatment produced, translated in to seven languages and distributed to at least 1000 recipients. The textbook will be the expanded version of the textbook produced under the phase-I, to include (among others) biological treatment methods.
- Handbooks/Guidelines on graduate supervision, entrepreneurship/innovation produced, translated and printed.
- One special edition of indexed international scientific journal and one research paper collection with at least 50 publications (alternatively at least 20 publications in Scopus/Web-of-Science citations) will be produced and distributed.
- Five joint online courses (e-learning) to be developed and utilized by partners
- At least five online lectures from Norway carried out.
- At least 20 student placements and 20 student research collaborations with industrial partners
- At least 10 dialogue meetings with future employers in all seven countries to improve curricula
- At least five job-fairs /career days held
- At least 10 master/PhD students graduate with double diplomas
- At least three workshops on entrepreneurship carried out
- At least 50% participation of females in all student mobility programs
- 9 laboratories are upgraded to cater courses developed in the project (including three with Erasmus+ funds).
- A joint university agreement on research and educational agreement among all 10 partners will be signed.
- At least three collaborative research proposals submitted for external international funding.

Long-term results:

- A strengthened and sustainable scientific and educational network with harmonized visions and attitudes
- Teaching programs are adopted to the needs of the society and the labor market.
- Entrepreneurship and innovative culture institutionalized among the partners' strategic development traditions
- Graduates are more adopted to the labor market needs and streamlined towards an efficient employment process.
- Establishment of a sustainable trust and mutual respect among the universities and public-private partnerships through dialogues, meetings and motilities.
- Five online courses with self-financing mechanism launched to ensure the quality and services continue beyond the project period.
- More internationally oriented teaching staff and students via continuous and repeated exposure.
- Establishment of a "Water Harmony Alumni Association" for sharing of, and contribution to, the continuous development of the cause of the Water Harmony initiative. Use of modern social networking (facebook, LinkedIn, etc) to promote this endeavour.

Project background

B.1.4 In what way does the project address the objectives and priorities of the programme, as specified in the Call for proposals?

The proposed project, in many ways, is the continuation of the previous SIU-Eurasia project “Water Harmony” with eight universities from five countries, noted here as phase-1. While consolidation of water related education was the focus in phase-1, the next phase re-orientates our teaching practices towards a focus on the needs of the society and labor market to a much greater extent:

The three biggest impacts from the completed project phase-1 were:

- (1) building an international network of enthusiastic educators
- (2) understanding and willingness to learn and share from partners leading to harmonized curricula
- (3) exposure to teaching and learning practices outside the home universities.

The proposed project continues on the same foundation, aiming at five new impacts:

- (1) transition of curricula from traditional academic orientation to the needs of the society and the labor market;
- (2) expansion of the network of educators to include public and private sector - institutionalizing new traditions;
- (3) orientation of graduate studies to include innovation, entrepreneurship and internationally acknowledged research;
- (4) expand national and regional collaboration through the expansion to seven countries and 10 partners, each with associated universities to share the results
- (5) increased interest and knowledge about Eurasia education among Norwegian students – through external funding.

It will be a demanding project to manage; the previous project was also demanding as the Norwegian partner alone had to a great degree lead the project. After 4 years of continuous networking and a gradual training process, there are now seven highly motivated and trained partners to share the leadership and coordination of this new project with 10 partners and over 25 associated partners.

B.1.5 Please outline the needs addressed by this project, and explain what steps have been taken to identify the demand for the proposed project activities within the primary target group(s)

The previous project team started the planning process for this application over one year ago, on needs identification and iteratively defining the realistic and cost & time efficient activities. The needs identification was carried out through networking meetings and questionnaires and also included three new partners from Tajikistan, Moldova and Kyrgyzstan.

- Need 1: curricula orientation towards labor market and societal needs: involvement of the public sector (authorities and utilities) and private sector (suppliers and service providers) in re-designing curricula, student placement, collaborative-contract research (target group: educators and motivated public and private sector partners)
- Need 2: sharing the experiences from a “surprisingly good and successful” network of universities and its benefits, project products and experiences to more universities: within the financial frame of the project it is only possible to include three more universities as formal partners, but each of the 10 partners are involving at least one associated partner (university) without consuming much of the project funding and whole-project-team resources. (Target group: educators from formal and associated partners)
- Need 3: mechanisms to transform the “abundant patents and author-certificates” culture to more realistic and market oriented innovations and entrepreneurship leading to commercialization, resulting in increased motivation among student and staff for innovation. Will be addressed through new educational concepts and tools and the involvement of private sector entrepreneurs (target group: educators from formal and associated partners)
- Need 4: More exposure to Norwegian teaching tools and concepts, leading to shaping the future of graduates and scientists towards a modern and globalizing world: Increased mobility of students and teachers from partner universities to Norway, distance learning and double-degrees. Activities will also lead to better preparation of international quality assurance qualifications. (target group: staff and students from IoN)
- Need 5: More exposure of Norwegian students and staff to Eurasian education and research: While some possibilities for Norwegian student exposures to Eurasia were also previously available through

the State Educational Fund, they were never utilized within the consortia. Additional funding through an already granted Erasmus+ project, and various future applications as well as increased marketing through the involvement of NMBU's student organization (AquariÅs-linjeforening) an increased mobility and exposure are expected. (target group: students and staff from liN)

• Need 6: involvement in more internationally recognized R&D: Collaborative research and publications with NMBU, access to international databases, support for open access and highly rated publications (Scopus and Web of Sciences cited) envisaged. (target group: loN Staff)

B.1.6 Please describe how each of the involved partners (liN, loN and any other network partners) will contribute to the project

NMBU will provide overall coordination and management of the project and will ensure that the aims and objectives of the project are met, results are delivered according with schedule and that this is in line with the proper and effective use of resources.

The operational management of the project will be led by the activities leaders, as noted below.

Distribution of activities between partners has been done based on their individual competences, revealed and developed in the previous project.

- NMBU (Norway): overall coordination, financial management, sharing of, and exposure to, Norwegian and international educational practices, communication management, contribution to innovation and entrepreneurship; will received students and staff to Norway, has teaching and research facilities and a network with public-private entities.
- USUCT (Dnepropetrovsk, UA): overall coordination of loN, management/documentation of project meetings and lab/equipment investments, curricula development, e-learning (coordinator); has teaching and research facilities and a network with public-private entities.
- NTUU-KPI (Kiev, UA): Innovation and entrepreneurship, collaboration with private entities, exposure of Norwegian students/staff to Eurasia, double degrees (coordinator); has teaching and research facilities and a network with public-private entities.
- CSTU (Cherkassy, UA): joint research activities and scientific publications (coordinator); has teaching and research facilities and a network with public-private entities.
- BSTU (Minsk, BY): Quality assurance of education and teaching materials (coordinator); has teaching and research facilities and a network with public-private entities.
- SKSU (Shymkent, KZ): involvement of associated universities and distance learning (coordinator); has teaching and research facilities and a network with public-private entities.
- MMIT (Khojand, TJ): Gender aspects (coordinator); has teaching facilities and basic lab facilities, flexibility to establish complete new courses
- TTU (Dushanbe, TJ): Collaboration with public entities (coordinator); has teaching and lab facilities, knowledge on working with public administration, economical and management perspectives
- TUM (Kishinev, MD): international conferences (coordinator); has teaching and basic lab facilities, access to EU resources
- KNU (Bishkek, KG): Knowledge sharing from partners (coordinator); regional collaboration capabilities, has teaching and basic lab facilities
- Public entities (all countries): revisiting the curricula, input on societal needs, student placement and collaborative research
- Private entities (all countries): revisiting the curricula, input on market orientation, innovation and entrepreneurship, student placement and collaborative research

Examples of partners, with confirmed interest (loN partner responsible for coordination given at the beginning):

Universities (educational partners)

- USUCT: Dniprodzerzhynsk State Technical University
- NTUU-KPI: National University Lviv Polytechnic, Odessa National Polytechnic University
- CSTU: Cherkassy National University
- BSTU: Vitebsk State Technological University, Brest State Technical University
- SKSU: Kazakh National Technical University, Almaty Technological University
- MMIT: Polytechnic Institute of Tajik Technical University, Khojand
- TTU: Institute of Water Problems, Hydroenergy and Ecology, Dushanbe
- TUM: Moldova State University

- KNU: Kyrgyz State Technical University

Enterprises (industrial partners)

- USUCT: SPC “SVK” PE, Dneprovodokanal Utility
- NTUU-KPI: SPC “Ecosoft” Ltd, Kievvodokanal PJSC
- CSTU: Cherkassyvodokanal Utility
- BSTU: Vitebskvodokanal Unitary Enterprise, CJSC “DiArKlass”
- SKSU: Water Resources Marketing Ltd
- MMIT: Office of melioration and irrigation of Sugh Region
- TTU: Dushanbevodokanal Utility
- TUM: Association of Water Treatment Plants “Moldova Apa-Canal”
- NMBU: A-Aqua, Ecomotiv, Doscon, several DWTP and WWTPs

Governmental authorities (governmental partners)

- USUCT, NTUU-KPI: State Sanitary and Epidemiological Service of Ukraine
- CSTU: Cherkassy Regional Agency on Water Resource Management
- BSTU: Ministry of Natural Resources and Environmental Protection of the Republic of Belarus
- SKSU: South Kazakhstan Ecology Department of State Ministry of Ecology
- MMIT, TTU: Environmental Protection Agency of Sughd Region
- TUM: Agency of Moldova Water at the Ministry of Environment of Moldova

Academic discipline

B.1.7 Which academic discipline is the project related to?

- 1: Environmental technology (411)
- 2: Ecology, Environmental Sciences (307)

B.2 Assessment of sustainability and risk

Sustainability

B.2.1 Please explain how the proposed project activities and the effects sought achieved through the project will be sustained and financed after the project period

- Motivation and dedication of the involved partners is key in societies where there are frequent organizational, financial and political instability and challenges. The experience from the last four years confirms the willingness to fight to keep the motivation and search for new/alternative possibilities despite other disturbing factors. Thus, the frequent networking to build an extended “Water Harmony family” will be in primary focus.
- The first edition of the textbook translated to five Eurasian languages were received with an enormous appreciation and popularity. The involvement of authors from all partners and addressing local needs and priorities are keys to local acceptability and embracement. The anticipated 2nd edition of the textbook will be expanded to cover all aspects of water management and treatment producing a teaching material accepted by all partners (existing book, for example, requires an expansion that includes biological wastewater treatment).
- E-learning platforms will contain the textbook material, teaching aid and other sources for an infinite time. NMBU has confirmed to finance the storage capacity for e-learning is based on the subscription-free Moodle platform.
- Mechanisms for income generating e-learning activities will be introduced to enable continuous updating and maintenance of resources
- Guidebooks on supervision, innovation and entrepreneurship will be developed and used in training sessions- a resource and knowledge that will continue to grow even after the project
- A “Water Harmony Alumni Association” will be established among students and staff to communicate, share and contribute to the continuous development of the results and impacts
- Learning on innovation and entrepreneurship is anticipated to build long-term self-financing relationships with the private sector
- The motivated Water Harmony Team will continue to search for external team research funding to expand and continue activities. (success story: just granted three-year Erasmus+ project involving three partners from Ukraine with NMBU as the coordinator).

B.2.2 Please describe how the project is linked to strategies and priorities at the involved partner institutions, and how the project will enhance long-term collaboration between the institutions

All of the partners, without exception, understand and set internationalization as a critical priority for the future. Over two-thirds of the partners have already identified innovation and entrepreneurship as a necessary activity to be included in the curricula (though they are yet to be included in their own courses), while others have already acknowledge the need. Several partners still suffer from the historical "predominantly academia-oriented" way of curricula structures and see the challenges for their graduates to find and adopt employments in the modern and rapidly changing world. Thus, all partners agree on the re-orientation of curricula towards the labor-market and societal needs.

Several partners already have individual MoUs on collaboration and it is envisaged to have a joint MoU with all partners, and additional MoUs with associated universities, public-private entities involved in the project.

Risk assessment

B.2.3 Please describe any risk factors/difficulties that may impede successful implementation of the project, and how the effects of such risks/difficulties may be mitigated

- Collapse of the designed implementation structure due to the complicated and demanding nature of the project (risk of "imperial overstretch"): The project has 10 lead-partners + 25 or more associated partners and the goals set forth are certainly ambitious. While it is acknowledged that such a project cannot be developed from the scratch and implemented with success by a newly formed, unexperienced consortia unknown to each other, the previous Water Harmony project documented its success and capabilities. The proposed project is building on, and drawing resources from, a known organizational structure with seven experienced partners that are known very well to each other. Thus, we strongly believe that we are capable of delivering what is planned.
- Negative political and administrative influence on partner activities: while it is impossible to fully safeguard against such factors, the consortia is determined to have preventive dialogues and actions with administrations at all times. The previous project survived the political instability in Ukraine to a greater degree. The experience from that as well as the consortia's flexibility will reduce any impacts.
- Foreign exchange crisis: Within the last 1.5 years, the Norwegian krone was devaluated against USD by over 30% and Ukrainian hryvna against Norwegian krone by 300%. The project has used NOK/USD=8 as the exchange rate contrary to NOK/USD=6 during the previous time, thus the negative sensitivity to the foreign currency risk is reduced.
- Challenges in involvement of public and private sector in the project without significant financial benefits from the project: The project is budgeted to cover the cost of participation of external partners at workshops held locally, generally not requiring lengthy travel and hotel costs. The consortia (international) partners will meet the external partners locally at such meetings. However an active and more frequent communication with external partners is anticipated through their respective coordinating/sponsoring partners located near the external partners.
- Funds transfers: Some countries and universities have complicated funds transfer mechanisms. Faster links and processes were established during the previous phase with 4 countries (UA, BY, TJ, KZ) and we anticipate our experience from them will resolve any challenges with the new countries and partners (MD, KG, TJ).

B.3 Additional information

Project summary

B.3.1 Please provide a short summary of your project (max. 250 words).

The Water Harmony-II (2016-2019) re-orientates water-related graduate teaching practices towards a greater focus on the needs of the society and labor market. This is built on the solid foundation laid by the Water Harmony- Phase 1 (2011-2014), where consolidation of water related education was in focus. The Water Harmony –II has four goals (1) Strengthening and expansion of institutional partnerships between NMBU and nine universities in seven partner countries through academic collaboration (2) Development of existing graduate programs towards more research, innovation, entrepreneurship and labor market orientation through partnerships with public and private sectors (3) Increase international orientation of study programs and competence of supervisors through academic partnerships and student-staff mobility between the partner countries and Norway and (4) Dissemination of the revitalized

curricula, teaching tools and concepts to other universities associated with the partner universities and to other resource persons and entities.

Partnerships with public and private organizations will be strengthened through their involvement in curricula improvement, joint supervision, internships and innovative research. More awareness, interest, knowledge and enthusiasm at Norwegian institutions and among Norwegian students are anticipated to be generated through mobility programs (including externally funded), guest lectures and seminars.

The main partners of the Water Harmony-II are the Ukrainian State University of Chemical Technology (Dnepropetrovsk, IoN Coordinator), National Technical University of Ukraine - "Kyiv Polytechnic Institute" (Kiev), Cherkassy State Technological University (Cherkassy), Belarusian State Technological University (Minsk), Technical University of Moldova (Chishinev), South-Kazakhstan State University (Shymkent), Tajik Technical University (Dushanbe), Kyrgyz National University (Bishkek) and the Mining-metallurgical Institute of Tajikistan (Khojand), and the Norwegian University of Life Sciences (Ås). Each of the partners will have three associated partners representing a university, public organization and a private enterprise.

The project is organized in such a way that large number of teaching staff (over 40), students (over 100) and resource persons (over 30) from public and private organizations will be physically meeting each other at the partner universities. The project management will benefit with the previous four years of collaboration experience.

The project is structured with 15 activities. The project goals will be achieved through networking, interactions, workshops, inter-partner supervision, research etc.; sharing of best practices among partner as well as dialogues and job fairs/"career days" with future employers, and the iterative process of improvement through student and staff evaluations of the project results; the large number of student-staff mobility's across countries and joint research, lectures and publications; alongside a more active and quality-oriented publishing culture as well as the involvement of associate partners from the public and private sector and associated universities.

The project has several milestones like 8 international project meetings at partner universities and 12 Skype/Lync meetings, development of five courses, student mobility programs, online courses and lectures, upgrading of text book which will be published in seven languages, strengthened labs, joint teaching and supervision, student placements. etc.

The Short-term results include international project meetings representing 10 universities; workshops open for external partners and students, intensive courses for MSc students at NMBU; exchange of master students and staff between Ukraine and Norway for research fellowships; production, translation and distribution of one text book on water management & treatment in seven languages; to produce a handbooks on graduate supervision, innovation and entrepreneurship; publications cited in Scopus/Web of Sciences, joint online courses and lectures developed and utilized by partners, student placements and research collaborations with industrial partners, dialogue meetings and job-fairs with future employers; double diploma for master/PhD students, workshops on entrepreneurship, upgraded laboratories.

A joint university agreement on research and educational agreement among all partners will be signed and at least three collaborative research proposals for external funding will be submitted. At least 50% participation of females in all student mobility programs will be secured.

The project envisages the following long-term results: A strengthened and sustainable scientific and educational network with harmonized visions and attitudes; teaching programs are adopted to the needs of the society and the labor market; entrepreneurship and innovative culture institutionalized among the partners' strategic development traditions; graduates at a greater length adopt to the labor market needs and streamline towards an efficient employment process; A sustainable trust and mutual respect among the universities and public-private partnerships are established through dialogues, meetings and motilities; Five online courses with self-financing mechanism are launched so the quality and services will continue beyond the project period; More internationally oriented teaching staff and students via continuous and repeated exposure; Establishment of a "Water Harmony Alumni Association" for sharing

of, and contribution to, the continuous development of the cause of the Water Harmony initiative. Use of modern social networking (facebook, LinkedIn, etc) to promote this endeavor.

Finally, this is an ambitious project requiring a coordinated team-effort from dedicated partners to accomplish the goal. The successful network and experience from phase-I of the project is an important and critical foundation for the management and implementation of this project.

Previous and parallel funding

B.3.2 Previous funding

The first Water Harmony-Eurasia project was funded through the SIU-Eurasia program as a main project and two extensions (CPEA-2011-10002, CPEALA-2013-101031, CPEALA-2014-10123), which are successfully completed with approved final reports.

Water Harmony students benefitted from a part of the CPEASTIP-H2011/10492 funds allocated to NMBU.

One Water Harmony PhD student was awarded a Quota-fellowship during the previous project. A new PhD student from Ukraine is starting her Quota program from January 2016, and intends to involve herself in the new project. She also plans for a double PhD-degree.

NMBU is the coordinator of a new Erasmus+ project with 10 partners from Norway, Poland, Germany, Ukraine, China and Sri Lanka. The three Ukrainian partners and the only Norwegian partner in the Erasmus+ project are represented in this proposed project. The funds from the Erasmus+ project will be used to enhance mobility from Ukraine to Norway and especially from Norway to Ukraine.

B.3.3 Concurrent applications

Not at present. However, we shall consider applying Erasmus fellowships funding if the project is granted.

Gender issues

B.3.4 Please describe how aspects relating to gender perspectives, gender balance and gender equality have been assessed and, insofar as relevant, implemented in the project

For the overall majority of the partners, there is no challenge in the involvement of female students in project activities and study programs, as they are often a majority of those represented. Especially in these universities, we will make sure that the mobility opportunities will be more equally distributed. TJ and KG universities still experience less involvement of female students, thus gender-focused campaigns will be launched at these universities.

Links to research

B.3.5 Please describe how the planned activities are connected to ongoing research activities and research cooperation at the partner institutions

Coagulation and membrane treatment are the most widespread processes in drinking water treatment and are also increasingly being used in wastewater treatment. Seven of the nine IoN partners do have coagulation units and four have RO/membrane units. There have been several collaborative MSc and PhD researches on these themes that will continue. Additional themes such as ozonation, ion-exchange, biological wastewater treatment etc. were among previous joint research, and shall continue to be focused also on in the coming period. Please see www.waterh.net for research descriptions.

Five specific research areas will be (1) improvement of the plant-availability of phosphorus in wastewater sludge (2) membrane bioreactors in small scale wastewater treatment plants (3) membrane processes in drinking water treatment (4) evaluation of adsorbent-coagulants in wastewater treatment (5) evaluation of novel Zr and Ti based coagulants are five concrete themes that NMBU currently work on with BSTU, NTUU-KPI and USUCT, respectively.

C - Activities to be supported

Choose project activities

The activities that can be supported under the main categories are:

Project development

- International project meetings
- Development of joint courses, study programmes and degrees
- Development of new educational materials and methods
- Publication and dissemination
- Other

Implementation of joint education activities

- Intensive study programmes, field schools, summer schools, excursions
- Short-term student mobility (up to 4 weeks)
- Long-term student mobility (more than 4 weeks)
- Student participation in research activities/projects
- Joint teaching and supervision, incl. guest lecturing and examination
- Joint online courses
- Workshops/seminars
- Language courses
- Courses/trainings/study visits for employees (administrative, technical, academic)
- Scientific equipment
- Infrastructure, literature, software
- Other

Joint education activities that include collaboration with enterprises in the public and private sectors

- Student work placements, internships
- Student projects with involvement from enterprises
- Student involvement in R&D projects
- Student entrepreneurship/contact with entrepreneurs/innovation
- Joint teaching/guest lecturing, supervision at all levels
- Other

C.1 Please indicate the type(s) of project activities involved in the project by ticking the boxes below

Collaboration with enterprises in the public and private sectors

Implementation of joint education activities

Project development

D - Project activities and budgetary allocations

D.1 Project development

Project development

Name: Double degree program - MSc and PhD
 Activity: Development of joint courses, study programmes and degrees
 Description: NMBU and selected partner universities will develop agreements for double degree programs. At least 11 MScs and 3 PhDs will be carried out as double degree programs. Eurasia grant funding is not proposed, but Erasmus+ funding and other external project funding will be utilised.
 Start: Mar/2016
 End: Dec/2019
 Participants: 14
 Budget:

NOK - Norwegian kroner	Budget 2016	Budget 2017	Budget 2018	Budget 2019	Sum
Activity					
Travel	0	0	0	0	0
Accommodation	0	0	0	0	0
Venue and transport	0	0	0	0	0
Teaching material	0	0	0	0	0
Other	0	0	0	0	0
SUM - Activity	0	0	0	0	0
SUM - Total	0	0	0	0	0

Comments: No funding from the Eurasia program is anticipated. NMBU has already secured 1 mill NOK to receive 11 MSc students for one year and one PhD fellowship (0,4 mill NOK) for the Double degree program. Additional funding will be available from NMBU's external projects.

Name: Development of e-learning module
 Activity: Development of new educational materials and methods
 Description: Based on the materials developed for the textbook and other practical courses, E-learning courses will be developed. Each partner will have free access to the platform (subscription-free Moodle type) and will be able to present and administrate the courses via their own portals. Any course fee shall contribute to the continuous upgrading of the content.

 NMBU coordinator has a preliminary agreement with the Academic Director of the United National University (www.UNU.edu, Tokyo) on the free use of their well-developed e-learning design and functionality for the Water Harmony courses. We plan to consider this possibility.
 Start: Jan/2017
 End: Nov/2019
 Participants: 100
 Budget:

NOK - Norwegian kroner	Budget 2016	Budget 2017	Budget 2018	Budget 2019	Sum
Activity					
Travel	0	0	0	0	0
Accommodation	0	0	0	0	0
Venue and transport	0	0	0	0	0
Teaching material	0	0	0	0	0
Other	0	20 000	30 000	0	50 000
SUM - Activity	0	20 000	30 000	0	50 000
SUM - Total	0	20 000	30 000	0	50 000

Comments: The costs of design for the e-learning portal is included here. The development of content are covered under section for textbook and teaching material development.

Name: Textbook and teaching material
 Activity: Development of new educational materials and methods
 Description:

- The textbook developed during the previous stage will be expanded, revised and published in seven languages, including Kyrgyz and Moldavian.
- The project will apply foreexternal funding to translate the textbook in to Norwegian and English (applications already submitted to elsewhere).
- New guidelines and exercises for lab and practicals will be developed.
- New handbooks on graduate supervision, entrepreneurship and innovation will be developed, which will be used and evaluated during teacher training & training of trainers sessions noted under the "Implementation of joint education activities-workshops".

 Start: Oct/2016
 End: Mar/2019
 Participants: 30
 Budget:

NOK - Norwegian kroner	Budget 2016	Budget 2017	Budget 2018	Budget 2019	Sum
Activity					
Travel	0	0	0	0	0
Accomodation	0	0	0	0	0
Venue and transport	0	0	0	0	0
Teaching material	0	50 000	200 000	0	250 000
Other	0	0	0	0	0
SUM - Activity	0	50 000	200 000	0	250 000
SUM - Total	0	50 000	200 000	0	250 000

Comments: Design and printing cost of the textbook in seven languages (RU, UA, BY, TJ, KZ, KG, MD) are included in the budget. Translation, design and printing in Norwegian and/or English is also an ambition, but not budgeted here as they will be carried out if and when the external funding will be secured. Design and printing costs of guidelines are included here.

Name: Joint project meetings
 Activity: International project meetings
 Description:

The project plans to have eight physical project meetings, with 20-25 participants over a duration of 3-4 days for single city and 6-7 days for dual city meetings. These meetings are foundation for the strengthening the international network of professional and social relations. Most of the project activities listed in the Section D will be implemented during these meetings and thus budgeted under this activity. The meetings shall have dedicated sessions addressing various activities. Instead of splitting the meeting costs "artificially" among the relevant activities, we have included all meeting costs, apart from the workshops costs, which are to be held back-to-back with project meetings. Total number of paticipants = 25x8 meetings=200.

 Start: Mar/2016
 End: Nov/2019
 Participants: 200
 Budget:

NOK - Norwegian kroner	Budget 2016	Budget 2017	Budget 2018	Budget 2019	Sum
Activity					
Travel	170 000	174 000	150 500	114 000	608 500
Accomodation	130 000	190 000	149 000	114 000	583 000
Venue and transport	104 650	110 250	90 650	85 050	390 600
Teaching material	0	0	0	0	0
Other	0	0	0	0	0
SUM - Activity	404 650	474 250	390 150	313 050	1 582 100
SUM - Total	404 650	474 250	390 150	313 050	1 582 100

Comments: Accommodation is provided for visiting participants, which will be 16-18 per meeting. In addition there are 3-5 participants from the host university. Accommodation is based lower rates than the Norwegian travel regulations. Venue and transport includes the meals, local transport etc.

Name: Dissemination of project publications
 Activity: Publication and dissemination

Description: The project will develop and publish several handbooks/guidelines (supervision, entrepreneurship, innovation and commercialisation etc) and these will be distributed both in hardcopies and electronically on the project webpage (www.waterh.net). Brochures on project and information about forthcoming workshops and publication etc will also be distributed to relevant participants. An alumni association with teachers and students who have participated in Water Harmony activities will be launched. Project reports, evaluation reports etc will also be produced within this activity.

Start: May/2016
 End: Dec/2019
 Participants: 200
 Budget:

NOK - Norwegian kroner	Budget 2016	Budget 2017	Budget 2018	Budget 2019	Sum
Activity					
Travel	0	0	0	0	0
Accommodation	0	0	0	0	0
Venue and transport	0	0	0	0	0
Teaching material	0	0	0	0	0
Other	10 000	10 000	20 000	9 377	49 377
SUM - Activity	10 000	10 000	20 000	9 377	49 377
SUM - Total	10 000	10 000	20 000	9 377	49 377

Comments: Only the printing costs and webhosting are included.

D.2 Implementation of education activities

Implementation of joint education activities

Name: IT hardware
 Activity: Infrastructure, literature, software
 Description: The three new partners (TJ, KG, MD) require laptops; some partners require upgrading of one lecture room for suitable for distance learning - with presentation and communication equipment.
 Start: Jun/2016
 End: May/2017
 Level: Master
 Participating students: 200
 Participating faculty: 9
 ECTS:
 Budget:

NOK - Norwegian kroner	Budget 2016	Budget 2017	Budget 2018	Budget 2019	Sum
Activity					
Travel	0	0	0	0	0
Accommodation	0	0	0	0	0
Venue and transport	0	0	0	0	0
Dissemination	0	0	0	0	0
Student scholarships	0	0	0	0	0
Other	100 000	100 000	0	0	200 000
SUM - Activity	100 000	100 000	0	0	200 000
SUM - Total	100 000	100 000	0	0	200 000

Comments: three laptops; Five stationary PCs; Four projectors; multimedia facilities; and reserve for other needs.

Name: Online courses and online lectures
 Activity: Joint online courses
 Description: The e-learning platforms developed using the textbooks and guidelines will be evaluated using at least 30 students. At least 10 online lectures will developed and performed, and will be included in the e-learning platform as off-line video lectures.
 Start: Oct/2016
 End: Oct/2018
 Level: Master
 Participating students: 30
 Participating faculty: 10
 ECTS: 15

Budget:

NOK - Norwegian kroner	Budget 2016	Budget 2017	Budget 2018	Budget 2019	Sum
Activity					
Travel	0	0	0	0	0
Accommodation	0	0	0	0	0
Venue and transport	0	0	0	0	0
Dissemination	0	0	0	0	0
Student scholarships	0	0	0	0	0
Other	0	0	0	0	0
SUM - Activity	0	0	0	0	0
SUM - Total	0	0	0	0	0

Comments: The development costs of the courses are budgeted under "project development- Development of new educational materials and methods", thus no financial resources are envisaged.

Name: TOEFL/IELTS exam training
 Activity: Language training
 Description: Some potential students may require assistance in language training courses and exam fees for TOEFL/IELTS. Students will be encouraged to attend specialised training at their home universities or cities, and a stipend will be given to those who pass with successful marks.
 Start: Jun/2016
 End: Aug/2019
 Level: Master
 Participating students: 20
 Participating faculty:
 ECTS:
 Budget:

NOK - Norwegian kroner	Budget 2016	Budget 2017	Budget 2018	Budget 2019	Sum
Activity					
Travel	0	0	0	0	0
Accommodation	0	0	0	0	0
Venue and transport	0	0	0	0	0
Dissemination	0	0	0	0	0
Student scholarships	0	0	0	0	0
Other	10 000	15 000	15 000	15 000	55 000
SUM - Activity	10 000	15 000	15 000	15 000	55 000
SUM - Total	10 000	15 000	15 000	15 000	55 000

Comments: A stipend will be given to selected students who document a need for English language training to cover the direct costs, provided they pass the exams with marks required to enter NMBU.

Name: Strengthening of educational labs
 Activity: Scientific equipment
 Description: All nine partners require strengthening of their teaching laboratories. Six partners received a partial upgrading during the last project. The three new partners require significant upgrading. The upgrading are related to the new teaching modules and equipment will partially also be used in research related to the project.
 Start: Mar/2016
 End: Dec/2016
 Level: Master
 Participating students: 200
 Participating faculty: 9
 ECTS:
 Budget:

NOK - Norwegian kroner	Budget 2016	Budget 2017	Budget 2018	Budget 2019	Sum
Activity					
Travel	0	0	0	0	0
Accommodation	0	0	0	0	0
Venue and transport	0	0	0	0	0
Dissemination	0	0	0	0	0
Student scholarships	0	0	0	0	0
Other	340 000	0	0	0	340 000
SUM - Activity	340 000	0	0	0	340 000
SUM - Total	340 000	0	0	0	340 000

Comments: The funds will be allocated for six partners apart from partners from Ukraine, who will receive funding through an Erasmus+ project. All are small equipment with maximum unit price of 25 000 NOK. Precision weighing machines, suspended solids/ conductivity sensors, ion-selective electrodes and scanning spectrophotometers are examples.

Name: Intensive summer school in Norway
 Activity: Short-term student mobility
 Description: Students from nine partner universities will be offered an intensive two-week summer course at NMBU and one additional week with practical work. This is an activity which had an enormous impact during phase-1, and further developments of it is already based on phase-1 evaluations and feed-backs. The course is organized as a formal course open to both guest students and Norwegian students, hence interaction and networking among students are also an expected impact. The activity repeats four times, each year during June/July. Two students from each university, apart from Kiev and Dnepropetrovsk with three students; 20 students/year. (This activity can also be categorized under "summer courses" in this application structure).
 Start: Jun/2016
 End: Jul/2019
 Level: Master
 Participating students: 80
 Participating faculty: 10
 ECTS: 10
 Budget:

NOK - Norwegian kroner	Budget 2016	Budget 2017	Budget 2018	Budget 2019	Sum
Activity					
Travel	84 000	84 000	84 000	84 000	336 000
Accommodation	120 000	120 000	120 000	120 000	480 000
Venue and transport	0	0	0	0	0
Dissemination	0	0	0	0	0
Student scholarships	80 000	80 000	80 000	80 000	320 000
Other	25 000	25 000	25 000	25 000	100 000
SUM - Activity	309 000	309 000	309 000	309 000	1 236 000
SUM - Total	309 000	309 000	309 000	309 000	1 236 000

Comments: Travel: flight/insurance/transfer costs, average 4200 NOK/student accommodating at NMBU hostels, 300 NOK/day x 20 days (short term rental)
 Fellowships: meals, local transport, other: 4000 kr per 20 days.
 Other: common transport, printing, social activities.

Name: One-year Research stays at NMBU
 Activity: Student participation in research activities/projects
 Description: 11 students from the Ukraine partners will be involved in one-year research stays where they will carry out research related to a double degree activity. This can also list under " Long-term student mobility (more than four weeks) "
 Start: Sep/2017
 End: Aug/2018
 Level: Master
 Participating students: 11
 Participating faculty: 4
 ECTS: 60
 Budget:

NOK - Norwegian kroner	Budget 2016	Budget 2017	Budget 2018	Budget 2019	Sum
Activity					
Travel	0	0	0	0	0
Accommodation	0	0	0	0	0
Venue and transport	0	0	0	0	0
Dissemination	0	0	0	0	0
Student scholarships	0	0	0	0	0
Other	0	0	0	0	0
SUM - Activity	0	0	0	0	0
SUM - Total	0	0	0	0	0

Comments: No financial contribution from the project is envisaged as all costs will be covered through an Erasmus+ project. Lab and analytical costs will be covered by external projects at NMBU where industrial partners are involved.

Name:	Workshops with IoN partners and associated partners					
Activity:	Workshops/seminars					
Description:	<p>When 18 educators from nine universities are visiting a partner, it is a unique opportunity to organise a seminar where the latest developments in the field can be shared with the students and staff of the host university. Such seminars are also beneficial for the associated public and private partners as well as other associated university partners. These seminars will be organised as back-to-back half-day activities when the international project team is visiting the partner cities. (The other half-day will be a workshop with associated partners that is described under a different activity).</p> <p>A series of teacher training & training of trainers sessions will be carried out during the international project meetings focusing on graduate supervision, entrepreneurship and innovation.</p>					
Start:	Oct/2016					
End:	Nov/2019					
Level:	Master					
Participating students:						
Participating faculty:	10					
ECTS:						
Budget:						
	NOK - Norwegian kroner	Budget 2016	Budget 2017	Budget 2018	Budget 2019	Sum
Activity						
Travel		0	0	0	0	0
Accommodation		0	0	0	0	0
Venue and transport		15 000	15 000	15 000	15 000	60 000
Dissemination		0	0	0	0	0
Student scholarships		0	0	0	0	0
Other		0	0	0	0	0
SUM - Activity		15 000	15 000	15 000	15 000	60 000
SUM - Total		15 000	15 000	15 000	15 000	60 000
Comments:	Travel and accommodation costs for partners are budgeted under International Project meetings; and for associated partners under "workshops with external partners". Venue costs here include the meeting refreshments/lunch and printing costs etc.					

D.3 Collaboration with enterprises

Collaboration with enterprises in the public and private sectors

Name:	Guest lectures and supervision from public and private organisations					
Activity:	Joint teaching/guest lecturing, supervision at all levels					
Description:	<p>As a step towards making education more adopted to the needs of society and the requirements of the labour market, relevant stakeholders will be invited to hold guest lecturing at partner universities as well as supervision during the research and practical periods. (Some are already involved in the MSc/PhD defense meetings but here the ambition is to involve them much earlier to give a realistic possibility of shaping the research and studies).</p>					
Start:	Sep/2016					
End:	Oct/2019					
Level:	Master					
Number of students:	200					
ECTS:						
Planned expenses:						
	NOK - Norwegian kroner	Budget 2016	Budget 2017	Budget 2018	Budget 2019	Sum
Activity						
Travel		0	0	0	0	0
Accommodation		0	0	0	0	0
Venue and transport		0	0	0	0	0
Student scholarships		0	0	0	0	0
Other		10 000	20 000	20 000	20 000	70 000
SUM - Activity		10 000	20 000	20 000	20 000	70 000
SUM - Total		10 000	20 000	20 000	20 000	70 000

Comments: Only the cost for travel reimbursements, refreshments, printing and symbolic honorarium (if required) are budgeted.

Name: Workshops with external partners
 Activity: Other
 Description: Dialogues with public and private partners as well as other associated university partners are important in the process of re-orientation of the curricula and teaching practices towards a more societal orientation as well as for the needs of the labour market. Workshops and discussion forums will be organised as back-to-back half-day activities when the international project team is visiting the partner cities. (The other half-day will be an open seminar where also students can participate). Local partners shall in addition organise job-fairs /"career days" where prospective employers and soon-to-be-graduates can mutually promote their potential. There are no such traditions at present at the partner universities.
 This activity also includes the Final Workshop.

Start: Oct/2016

End: Nov/2019

Level: Master

Number of students:

ECTS:

Planned expenses:

NOK - Norwegian kroner	Budget 2016	Budget 2017	Budget 2018	Budget 2019	Sum
Activity					
Travel	3 000	6 000	6 000	6 000	21 000
Accommodation	2 000	4 000	4 000	6 000	16 000
Venue and transport	10 000	15 000	15 000	23 000	63 000
Student scholarships	0	0	0	0	0
Other	0	0	0	0	0
SUM - Activity	15 000	25 000	25 000	35 000	100 000
SUM - Total	15 000	25 000	25 000	35 000	100 000

Comments: Travel and accommodation costs for participants from IoN are budgeted under International Project meetings. The travel and accommodation costs for any associated partners will be covered here, only if that will be absolutely necessary. Venue costs include the meeting refreshments/lunch and printing costs etc for workshops and job-fairs.

Name: Student R&D projects with external partners
 Activity: Student projects with involvement from enterprises
 Description: Increase of the interaction with the external partners, especially the enterprises, will be an important re-orientation of the student projects. They will not only give a mutual understanding between the student and enterprise, but also give the possibility to the teaching staff to strengthen collaborations and also to better understand the enterprise's needs. The 10 partners have about 20 potential candidates for this activity (listed in B.1.6), which will be associated with the MSc-thesis research of students. (30-60 ECTS depending on duration of 6-12 months)

Start: Jul/2016

End: Nov/2019

Level: Master

Number of students: 30

ECTS: 30

Planned expenses:

NOK - Norwegian kroner	Budget 2016	Budget 2017	Budget 2018	Budget 2019	Sum
Activity					
Travel	5 000	10 000	10 000	10 000	35 000
Accommodation	0	0	0	0	0
Venue and transport	0	0	0	0	0
Student scholarships	0	0	0	0	0
Other	5 000	25 000	25 000	25 000	80 000
SUM - Activity	10 000	35 000	35 000	35 000	115 000
SUM - Total	10 000	35 000	35 000	35 000	115 000

Comments: Only a symbolic sum of 5000-10000NOK/year is allocated to cover travel expenses. Additionally 5000-15000 NOK/y is allocated for experimental costs. It is anticipated that the agreements with enterprises will provide some funding. For the research

stays in Norway, about 100 000 NOK is allocated for 11 students for one year through an Erasmus+ project.

E - Budget

Budget

NOK - Norwegian kroner	Budget 2016	Budget 2017	Budget 2018	Budget 2019	Sum
Collaboration with enterprises					
Joint teaching/guest lecturing, supervision at all levels - Guest lectures and supervision from public and private organisations	10 000	20 000	20 000	20 000	70 000
Other - Workshops with external partners	15 000	25 000	25 000	35 000	100 000
Student projects with involvement from enterprises - Student R&D projects with external partners	10 000	35 000	35 000	35 000	115 000
SUM - Collaboration with enterprises	35 000	80 000	80 000	90 000	285 000
Implementation of education activities					
Infrastructure, literature, software - IT hardware	100 000	100 000	0	0	200 000
Joint online courses - Online courses and online lectures	0	0	0	0	0
Language training - TOEFL/IELTS exam training	10 000	15 000	15 000	15 000	55 000
Scientific equipment - Strengthening of educational labs	340 000	0	0	0	340 000
Short-term student mobility - Intensive summer school in Norway	309 000	309 000	309 000	309 000	1 236 000
Student participation in research activities/projects - One-year Research stays at NMBU	0	0	0	0	0
Workshops/seminars - Workshops with IoN partners and associated partners	15 000	15 000	15 000	15 000	60 000
SUM - Implementation of education activities	774 000	439 000	339 000	339 000	1 891 000
Project development					
Development of joint courses, study programmes and degrees - Double degree program - MSc and PhD	0	0	0	0	0
Development of new educational materials and methods - Development of e-learning module	0	20 000	30 000	0	50 000
Development of new educational materials and methods - Textbook and teaching material	0	50 000	200 000	0	250 000
International project meetings - Joint project meetings	404 650	474 250	390 150	313 050	1 582 100
Publication and dissemination - Dissemination of project publications	10 000	10 000	20 000	9 377	49 377
SUM - Project development	414 650	554 250	640 150	322 427	1 931 477
Sub-total	1 223 650	1 073 250	1 059 150	751 427	4 107 477
Project management					
Project management	370 000	370 000	380 000	380 000	1 500 000
SUM - Project management	370 000	370 000	380 000	380 000	1 500 000
Project administration					
Project administration	111 555	100 984	100 741	79 243	392 523
SUM - Project administration	111 555	100 984	100 741	79 243	392 523
SUM - Total	1 705 205	1 544 234	1 539 891	1 210 670	6 000 000

E.2 Comments to project management

Two-three man-months/year of the NMBU Project Manager and three man-months of a Project Secretary of NMBU is included for four years = 1 150 000 NOK. The IoN project manager shall be a leading scientist/professor with fluency in Russian and management of complex international projects. The IoN secretary must have an MSc in a water related field, be fluent in Russian and affiliated to NMBU.

350 000 NOK is allocated for salary compensation of coordinators of partner (IoN) universities. The rates are based on actual salaries including social costs only.

E.3 Comments to the budget

Many activities are planned to be carried out during the 10 international project meetings. These meetings will have dedicated sessions scheduled to cover various activities in the above list, in addition to the normal project management tasks. Thus although the allocation for International project meetings is relatively high (1 582 100 NOK), they represent the cumulative costs of many project activities to be carried out during the meetings.

Several activities are reported with none or low budgets. This is because either the cost components are noted elsewhere (for example, under international project meetings) or partially or fully financed by external projects.

Since all three IoN partners from Ukraine and NMBU have already won an Erasmus+ grant, some activities will be fully or partially funded through those funds. By doing so we have been able to include more activities under the umbrella of the Water Harmony-II project, as well as to avoid double funding.

Confirmation

Confirmation

By checking the box, you confirm that the information provided in the application is in all respects correct, and that the application is approved at the appropriate administrative and academic levels at the Institution in Norway.

Appendix A: CV's

Name: Ratnaweera, Harsha
 E-mail: harsha.ratnaweera@nmbu.no
 Gender: Male
 Qualifications: Please see the attached CV

Name: Smotraiev, Roman
 E-mail: smotr00@gmail.com
 Gender: Male
 Qualifications: Dr. Smotraiev's main research areas are production of nanodispersed metal oxide compounds from transition metals and the porous materials based on them (adsorbents, catalyst supports, etc.), for the waste management industry.

His research focus during the last decade has been: the scientific principles and technological aspects of metal oxide technology, organ metallic compounds and mineral fertilizers (2001-2005); Development of the scientific foundations and new resource saving technologies in the production of inorganic substances and mineral fertilizers (2006-2010); Working out scientific principles and new technologies of thin inorganic synthesis, mineral fertilizers and resource saving technologies (2011-2015); scientific basis of nanodispersed synthesis of oxides and oxide compounds, which are structurally associated with polymers for composite materials (2008-2010); and the Physicochemical basis of the process modification of composite material by nanodispersed compounds Ti, Al, Ca, which is chemically precipitated from solution (2011-2013).

Dr. Smotraiev worked as project coordinator in project CPEA-2011/10002 Development of three study modules in water management and technology for Ukraine, Byelorussia, Kazakhstan and Tajikistan harmonised with Norway ("Water Harmony") (2011-2015).

At present Dr. Smotraiev is lecturing in Chemical technology of calcined and caustic soda, Fundamentals for technological design of chemical productions, Fundamentals of design of nature protection technologies, Technologies of thin inorganic synthesis and on the nature protection technologies.

Year	Institution	Degree
1996	Ukrainian State University of Chemical Technology, Dnepropetrovsk (Ukraine)	Master of Science
2002	Ukrainian State University of Chemical Technology, Dnepropetrovsk (Ukraine)	Doctor of Philosophy

Start year	End year	Organisation	Position
1999	2004	Ukrainian State University of Chemical Technology, Dnepropetrovsk (Ukraine)	Research Assistant
2004	2009	Ukrainian State University of Chemical Technology, Dnepropetrovsk (Ukraine)	Associate Professor
2009		Ukrainian State University of Chemical Technology, Dnepropetrovsk (Ukraine)	Head of Educational and Scientific Center

Publications: Arsenic removal by zirconium oxyhydroxide adsorbents. Sorochkina K., Smotraiev R., Ratnaweera H. Selected publications from the Water Harmony project: Water Research and Technology, 2015. – P. 235-245.
 Colloidal and chemical aspects of nanosized hydrated zirconium dioxide synthesized via a sol–gel process. Chepurna I., Smotraev R., Kanibolotsky V., Strelko V. Journal of Colloid and Interface Science. - V.356 - 2011. – P. 404-411.

Physico-chemical methods of water purification. Water resources management - text book; in Russian. – 2015. – 615 p. ISBN 9788299997805

Project on upgrading of a drinking water treatment plant. Chekalova I., Smotraiev R. // Proceedings of the international conference of Water Harmony project on European education, Cherkassy, 2013. – P.38-42.

Zirconium and aluminum oxyhydroxides particles formation during sol–gel process. Sorochkina K., Smotraiev R., Chepurna I. Colloids and Surfaces A: Physicochemical and Engineering Aspects.- V.484. – 2015. P.56–61.