Institut de Recherche pour le Développement
FRANCE

Appel à projets 2018
« Laboratoires mixtes internationaux » (IJL)

Dossier complet de projet IJL

Date limite de soumission: 29 juin 2018

FICHE D'IDENTITE DU IJL

Sigle et Titre complet du LMI

« LE CARE »: CENTRE ASIATIQUE DE RECHERCHE SUR L'EAU

–International Joint Laboratory

A laboratory dedicated to the study of the
Low **E**levation **C**oastal zone in south of vietnam, **A**nalysis of water **R**esources and **E**volutions

Noms, titres et adresses électroniques des porteurs pressentis

Nguyen Phuoc Dan (npdan@hcmut.edu.vn), currently head of CARE-Rescif Laboratory and Dean of the Faculty of Environment and Natural Resources (FENR)
Nicolas Gratiot (Nicolas.gratiot@ird.fr), co-funder and scientific head of CARE-Rescif Laboratory since 2013

Laboratoires / facultés partenaires principaux du projet

Ho Chi Minh University of Technology

1. Faculty of Environment and Natural Resources (FENR)
2. Faculty of Geology and Petroleum (GeoPet)
3. Faculty of Civil Engineering (FCE)
4. Faculty of Chemical Engineering (FChE)

IRD Mixed units of Research :

5. Institut des Géosciences de l'Environnement (IGE, UMR 5001, PI of LE CARE-IJL for France)
6. Laboratoire d'Etudes en Géophysique et Océanographie Spatiales (LEGOS, UMR 5566)
7. Institut Méditerranéen d'Océanologie (MIO, UMR 7294)
8. Gestion de l'Eau, Acteurs et Usages (G-EAU, UMR 183)

Grenoble INP

9. Institut des Géosciences de l'Environnement (IGE, UMR 5001)
10. ENSE3 :L 'École nationale supérieure de l'énergie, l'eau et l'environnement

All these partners already put and/or announced future co-fundings (money and/or laboratory implications in terms of MLD / expats / PRPT/ equipments / internship funding or PhD co-funding)

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In case of success, the partnership agreement will be co-signed between IRD, Grenoble INP and HCM-UT

Equipes associés au projet (le cas échéant)

Partners from **IJL LUSES** (http://www.luses.ird.fr/) : with a specific objective on the regionalisation to the Lower Mekong Delta ; undergoing actions with O.Ribolzi and Lao partners
Partners from **IJL LOTUS** (http://lotus.usth.edu.vn/) : with a specific objective on sharing methodology and comparison Land to Ocean fluxes in the North and South of Vietnam ; scientific actions already launched with S.Ouillon, H.Loisel and S.Biancamaria.
Partners from **JEAI WARM** (WAter Resources and disaster Management using artificial intelligent systems)
Note that CARE was co-member of **IJL SEDES** (http://sedes-ijl.com) (stopped in 2018).

From 2019, CARE will be the sole french laboratory in the south of Vietnam working on water issue

Institutions associées au projet (le cas échéant)

In Ho Chi Minh City :

- University of Social Sciences : Dr. Ngo Thu Trang ; perception of risks (floods/salinisation)
- The Department Of Natural Resources and Environment (via the operational Center of Environmental Monitoring who is in charge of Air and Water pollution in the province of Ho Chi Minh City)
- Southern Institute of Water Resources and Research (SIWRR)
- Wanasea EU-project, under the supervision of Stéphane Lagrée

Western partners

- Laboratoire des écoulements géophysiques et industriels (LEGI, UMR 5519),
- Institut des Sciences de la Terre (Isterre, UMR 5275),
- Laboratoire de conception et d'intégration des Systèmes (LCIS, EA3747)

from RESCIF network (Réseau d'Excellence des Sciences de l'Ingénieur de la Francophonie)

- Grenoble INP (founder of CARE laboratory with HCMUT in 2013)
- Ecole Polytechnique Fédérale de Lausanne (EPFL)
- Ecole Polytechnique de Montréal (PolyMtl)
- Université Catholique de Louvain (UCL)

External support through donations (see appendix 8c and 8d):
The french embassy will provide funds to promote links between Education/Science and Society.
Five private companies will provide a financial support and participate to the governance to promote exchanges and collaborations (Artelia, Compagnie Nationale du Rhône, Vucico, Vinci and Wality.

In total sponsorship commitments reach 24k€ (2019-2021) and could be extended through (2022-2023)

Priorité(s) thématique(s) et discipline(s)

LE CARE-IJL project **will focus on the analysis of water resources and its evolution in the Low Elevation Coastal Zone (LECZ) in south of Vietnam.** It is organised to address three societal questions:

- ➢ **Water and Critical Zone (CZ)** :
  What is the current (and coming) level of pollution of surface waters and how it impacts people?
- ➢ **Water, hazards and vulnerabilities** :
  Is the Mekong delta region able to keep pace with coastal erosion, flooding and salinisation?
- ➢ **Water and health:**
  How engineering techniques can provide solutions to reduce risks and adapt to the new paradigm?

The **disciplines** gathered to answer to those priorities are: hydrology, sedimentology, biogeochemistry, geology, hydrogeology, geomorphology, geophysics, oceanography, human geography and engineering for water treatment.

- **Abstract :** In just a few years, the deltaic zones of the Lower Mekong and Ho Chi Minh City have undergone such profound changes that we can speak of a new paradigm. Adapting to its changes is essential to guarantee the food, environmental and economic security for the 25 million inhabitants in the delta / littoral continuum. During its first 5 years of existence, the Asian Center for Water Research has built-up a North-North-South-South partnership on the topic of water resources, by conducting interdisciplinary research. With LE CARE-IJL, our ambition is to enhance the research actions of all faculties and UMRs involved in the project dedicated to Mekong delta region, create the necessary conditions to gather initiatives around project calls, strengthen international collaborations in the Low Elevation Coastal Zone (LECZ) in the south of Vietnam, and to propose an integrated and comprehensive vision of the water resources in this endangered region.

LE CARE-IJL will adress three main societal issues which deal with the quality of waterbodies, risks and hazards, and water-related technologies. To tackle this objective, more than 20 scientists (>25% of time) coming from Vietnam, France, and an international network (mainly Switzerland, Belgium and Canada) are joining their efforts. After 5 years of building a platform for collaborative research, the CARE laboratory has successfully developed a governing structure with the goal to ensure continued activity beyond the timeframe of the IJL. The current fundraising dynamic of the CARE laboratory reflects this goal, with income from: scientific calls (>1.5M€ until now), yearly co-funding from institutional partners (HCMUT/IRD UMRs /Grenoble INP), and thirdly additional small funds from private companies and from the french embassy (guarantee of financing if LE CARE-IJL is accepted).
The creation of the LE CARE-IJL presents a unique opportunity to build on the Care laboratory framework and significantly consolidate and regionalise the dialogue between education-research-and society. Being able to anchor the CARE laboratory for several more years (10 years or more) is believed to be the most efficient way to apprehend the water-related challenges ongoing in the densely populated coastal zones of south of Vietnam, and more broadly, in South East Asia.

1. Presentation of partnership organization and of the LE CARE-IJL governance

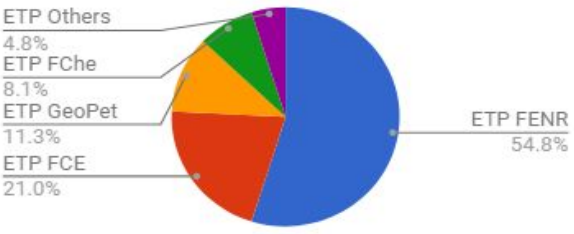
Since its inauguration in 2013, CARE is officially one of the “Research Centers” of Ho Chi Minh University of Technology (HCMUT) (http://www.hcmut.edu.vn/en). It is under the direct governance of the Rector, with the same rights and duties than faculties. It serves as a hub to boost international collaborations on our topic of interest : Water resources and evolutions in the Low Elevation Coastal Zone (LECZ) in south of Vietnam. The organisation detailed in Fig 1 results from our experience since 2013.
For the forthcoming five years, we will be organised in three main axis that address three main societal issues, which are themselves sub-divided into five **executive issues** (connected with 13th water related processes WrPs). Each executive issue is under the responsibility of two permanent scientists of both HCMUT and French labs – and/or RESCIF partners. Each executive issue does support “teaching by research” young scientists (internships, PhD) and seeks for calls.

LE CARE-IJL consolidates the partnership with our single partner, the Ho Chi Minh University of Technology. It involves vietnamese colleagues from four faculties (described here bellow) and thus provides a unique structure to develop an holistic approach to tackle some of the most pressing environmental challenges of the 21st Century at regional scale.

SOUTH PARTNER :

THE HO CHI MINH UNIVERSITY OF TECHNOLOGY

HCM-UT FENR (5 people, 3.4 ETP involved in executive issues 1, 2 and 5): Faculty of **E**nvironment and **N**atural **R**esources (FENR) was established in 1999 for the sake of urgent social demand of training and



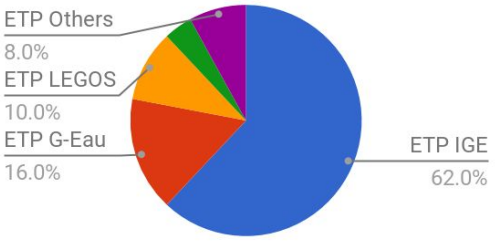
research on environmental pollution controls, use of sustainable natural resources, growth of renewable energy and adaptation of climate. The FENR currently has 05 academic departments: (i) Environmental Engineering, (ii) Environmental Management, (iii) Resources and Environment Informatics, (iv) Health, Safety and Environment and Water Science and Technology. FENR has bachelor, master's and doctoral training programs on Environmental Engineering, Environmental and natural resources Management and Public Policy and Environmental Protection. FENR-CARE laboratory was set-up in 2013 to strengthen the collaboration in terms of jointly use of facilities like laboratory equipment and exchange of human resources including faculties, students and foreign experts. FENR-CARE laboratory provided convenient conditions of lab-working (such as analysis, sampling, survey, etc.) for internship students as well as experts from HCMUT and RESCIF's members.

HCM-UT FCE (4 people, 1.3 ETP involved in executive 3): The **F**aculty of **C**ivil **E**ngineering, originally founded in 1957 now counts 200 academic and administrative staff and has established 7 well-equipped Labs and 2 Research Centers. The research focuses on reinforced civil engineering structures, structural stability & optimization, solid waste materials for construction, study on the erosion and accretion in river & estuary, computational river & near-shore modeling, coastal & river dynamics, responses of structures under wave actions, numerical modeling, planning & technical design in the fields of Hydrology and surveying, cartography, cadastre, remote sensing and GIS.

HCM-UT GeoPet (2 people, 0.7 ETP involved in executive issue 4): Faculty of **Geo**logy & **Pet**roleum Engineering (GEOPET) has 36 teaching staffs, researchers, technicians, and 3 supporting staffs and currently, eleven PhD students working on topics closely related with LE CARE-IJL axis (groundwater recharge, assessment of groundwater vulnerability from GIS-based modelling, contamination from surface and saline intrusion related to the climate change and groundwater intaks, modern sedimentation processes in mangrove forest, river bank erosion, subsidence and flooding in the urbanization). A strategic development of the faculty consists in upgrading the equipments for research in geophysic tools, groundwater modeling, geotechnical engineering risk management. The main topic of GEOPET relates to the LE CARE-IJL project is *Vulnerability Evaluation of the Recharge Zone(s) for the Shallow Aquifer in Ho Chi MInh City using geographical resistivity methods.*

HCM-UT FChE (1 people involved, 0.5 ETP through executive issue 1): Founded in 1962, the **F**aculty of **Ch**emical **E**ngineering is a unique organization in the south of Vietnam that offers academic programs leading to the award of Bachelor of Engineering, Master of Engineering, or Doctor of Philosophy in Chemical Engineering, Food Technology, or Biotechnology. It counts 90 teaching staff. Many research works have been carried out successfully and applied in the Mekong Delta region. The research focus areas are on various topic, from genetic to nano-particles and nano-structured materials. The collaboration with LE CARE-IJL concern the hot topics of pharmaceutical and environmental processes across the length scales. (from molecules to industrial scale), treatment of heavy metals, toxic agents in water effluent.

NORTH PARTNERS (with IRD as members):



IGE (7 people, 2.8 ETP, executive, issues 1 to 4) (http://www.ige-grenoble.fr): is a public research laboratory in Earth and Environmental Sciences. IGE is supervised by CNRS / INSU, IRD, Université Grenoble Alpes (UGA) and Grenoble INP. The staff of the laboratory is around 240 people, of whom 145 permanent members and about 95 doctoral students, postdoctoral fellows and staff on fixed-term contracts. IGE conducts research on climate, the water cycle, cryosphere and natural and anthropized environments. This research aims to better understand the processes that govern the various geophysical compartments (ocean, atmosphere physics and chemistry, cryosphere, watersheds, critical zone), their interactions and responses to human pressures, and the processes of adaptation and resilience of societies. The common topics with LE CARE-IJL project are a) *Processes and vulnerability of the Critical Zone for better management and*

protection of the resource and the environment and b) The intensification of the hydrological cycle and its interactions with societies. To carry out this research, the IGE approach is based on a strategy combining observations, instrumental development and modelling.

Other north partners

G-EAU & EMMAH (3 people, 0.8 ETP through executive issue 1 and 4) : Research at the UMR G-EAU (Gestion de l'Eau, Acteurs, Usages) unités Science and Technology, Life and Environmental Sciences, and Human and Social Sciences to respond to knowledge gaps in integrated and adaptive water management with a non-restrictive focus on irrigated areas. The research unit notably includes expertise on the interfaces between disciplines in order to address complex water-agriculture-environment-government issues. Created in 2005, G-EAU regroups 70 permanent researchers and engineers (from AgroParisTech, CIRAD, IRD, IRSTEA, and Montpellier SupAgro), and 50 doctoral and postdoctoral students.

The UMR EMMAH is composed of 73 permanent staff from the National Research Institute for Agronomy (INRA) and the University of Avignon. It focuses on the study of water resources in agricultural regions in the face of global and climate change. The Hydrogeology research group has developed innovative approaches to quantify the interactions between surface water and evaluate the impact of climate change.

LEGOS (2 people involved, 0.35 ETP through executive issue 3): Laboratoire d'Etudes en Géophysique et Océanographie Spatiales (LEGOS) is a multi-disciplinary research organisation, concerned with environmental research centered on physical oceanography (coastal and large scale), marine geochemistry and biogeochemistry, spatial hydrology and the dynamics of polar ice sheets. These research themes are linked by an observational approach using remote sensing from satellites, for a better assessment of oceanographic processes (for planning and exploiting satellite missions), which has greatly motivated the development of numerical circulation models at LEGOS, with applications ranging from estuarine to coastal and oceanic regions. LEGOS comprises personnel from CNES, CNRS, INSU, IRD and Paul Sabatier University (UPS). LEGOS has about 100 members: 40 researchers, 20 technicians and 30 postgraduate students and postdoctoral and contract staff.

MIO (1 people involved, 0.2 ETP, through executive issue 2) : The Mediterranean Institute of Oceanography is a research laboratory in Oceanology of the Universities of Aix Marseille, Toulon, CNRS and IRD. Its objectives are to better understand the ocean system and its evolution in response to global change. It is a center of expertise in marine biology, ecology, biodiversity, microbiology, fisheries, physics, chemistry, biogeochemistry and sedimentology. The team 'Environmental Chemistry' aims to understand the processes that control the chemistry of the marine environment and the cycle of organic matter and associated chemical elements. MIO gathers more than 200 people including a hundred researchers (CNRS, IRD) and university professors, about sixty engineers and technicians, more than 50 PhD students.

Grenoble Institute of Technology (Grenoble INP, 3 people, 0.5 ETP, through executive issue 1 and 5 and innovative education) : With professional-oriented courses, six engineering schools (including ENSE3 and an international master in hydraulics) and renowned research & development services amongst international scientific and industrial community, Grenoble INP institute of engineering Univ. Grenoble Alpes is one of the best engineering schools in France and the world. Within the RESCIF network, Grenoble INP was the western partner in charge of setting up CARE laboratory, since 2012. During the last five years, CARE received supports from Grenoble INP for research (IGE, LEGI and LCIS laboratories), the design of innovative education (PERFORM) and institutional and strategic expertises (DRIVE).

Strengths for the completion of LE CARE-IJL as an International Joint Laboratory:

Our mission : LE CARE-IJL is devoted to produce relevant scientific researches applied to evolution of water resources and evolutions in the Low Elevation Coastal Zone in the south of vietnam (LECZ). CARE

laboratory has been built up in 2013 by the partners of the RESCIF network, with the support IRD. The co-funders of LE CARE-IJL share the common vision that a research and capacity building plate-form dedicated to water challenges and settled in Ho Chi Minh was the right way to build relevant scientific research and engineering studies closer to the population needs. LE CARE-IJL is also well positioned to contribute (and do so) to the Sustainable Development Goals 6 (Clean Water and Sanitation), 11 (Sustainable cities and communities), 13 (Climate change) and 14 (Life below water). CARE is actively contributing to the strategic “PSIPs” IRD programs: “Littoral” and “Villes côtières”.

Facilities : CARE building is located in the campus of HCM University of Technology. It includes 4 offices (12 desks, 1 workspace (12 desks), 1 small conference rooms (25 people), 1 meeting room (15 people), a chemical laboratory platform, with several equipment provided by several structures, one roof top for events and conviviality. During its « incubation » period CARE has put its priorities to the consolidation of scientific teams and formation of students through the completion of masters and Phds within RESCIF network.


Since 2013, about twenty scientific projects were accomplished for a total funding higher than 1.5M€. In order to ascertain the feasability of the projects with respect to the environmental situation of the Mekong Delta area, and later on to make a large dissemination of the results, two international conferences were organized by CARE. Firstly in Nov.2014 under the label of Entretiens Jacques Cartier (https://www.centrejacquescartier.com/les-entretiens/ « L’eau en partage, Enjeu de développement dans la Région du Mékong ») with a large représentation of colleagues from Québec, Francen Switzerland and several Asian countries ; the second in Nov. 2017 concerning the results obtained within the COOPERA funding programme, with a large international participation from members of RESCIF. We also co-organized three other international conferences among which two of them were published in proceedings by Springer and Elsevier editors.
The paper production now reaches 18 for ISI referenced journals, 31 additional papers in international and national journals , 40 oral presentations in conferences and 15 posters.

Former projects : Since 2013, about twenty scientific projects were accomplished for a total amount higher than 1.5M€). Scientific results have been presented in many conferences. We organized or co-organized five international conferences, among which two of them were published in proceedings by Springer and Elsevier editors. The paper production reaches 18 for ISI referenced journals and 31 additional papers in non references international and national journals. This incubation period gives a strong basis to anchor LE-CARE-IJL and define precisely the current scientific knowledge gaps and societal challenges that we wishe to address first. They are gathered in five executive issues detailed herebellow.

Education : Concerning education, CARE organized five short courses , one summer school and contribute actively to the capacity building through the supervision of masters (3), PhD (8) and post-doctoral (3) students. CARE also promote student exchanges with the support of EtuRESCIF (eturescif.net). In total more than one hundred of internships have benefitted from CARE facilities, coming principally (but not only) from associate engineering schools of the RESCIF network.

All mobilities exceeding three weeks can be consulted on the website

https://docs.google.com/document/d/1dAtp9An9_NdSE_S12exzYtt8JurXqpaCCq2TfEqTRxA/edit

CARE also provided some innovative education resources, by launching the first « north-south » Massive Open Online Course (**MOOC**) in the world. After four annual session our MOOC entitled “Des rivières et des hommes” (http://mooc-rdh.info) as reached more than 4500 students from 83 countries.

All structurating education initiative conducted by CARE are detailed in Appendix 12.

Man-power : Since 2013, IRD assigned scientist in CARE through long term visit (11.5 years in total) and short term visits MLD (3 North South and 2 South North, up to now) from (to) IGE, LEGOS and G-EAU laboratories. Two young researchers have also been recruited by IRD (Chargé de Recherche de 2ème classe) to built their scientific projects within CARE (Emilie Strady, 2012 ; Christine Baduel, 2017). Partners of the RESCIF network also contributed actively to CARE activities with the visit of more than 30 scientists from France, Swiss, Canada and Belgium ; the supervision of master and PhD vietnamese students from CARE and the leading of projects.

IJL funding and co-fundings : LE CARE IJL project asks for an accompanying funding (8 to 10 keuros only per year) to support the “maturation” of the laboratory after the 2013-2018 “incubation” period (see detailed budget in Appendix 6). Indeed, aside from research grants obtained by the scientists,CARE’s yearly financial expenditures are nowadays provided (and secured) by Vietnamese HCMUT (20 keuros), French research units through yearly IRD grant for IGE, 18 keuros), Grenoble INP (6 keuros) as well as -very recently- by private companies and French embassy (8 keuros/years over three year). LE CARE IJL complementary funding will be necessary to consolidate the governance and reach the objective of being recognized as an international research laboratory playing a key role regarding academic, research and transfers to society around water issues in south Vietnam (and sub-regionally).

Past and current fund raising from structurating projects: among the twenty projects funded over the last five years, we can underlines few projects which aggregated the research activities of many scientists and contributed to additional fundraising:

COOPERA (2013-2017) : CARE has lead the COOPERA project (2013-2017, 140k€, 9 partners, PI. N.Gratiot and V.Dinh.Than) which focused on the impact of HCMC urbanization on surface water quality (issues 1 and 2 of LE CARE-IJL proposal). The project focuses on : 1) the evolution of the Saigon River hydro-system in connection with the development of the Ho Chi Minh City megacity, 2: an assessment of surface water contamination, 3) the vulnerability of the megacity to floods. In 2016, this project has been reinforced by a companion project funded by AUF, to study the social adaptation of inhabitants to floods. COOPERA results were disseminated in several conferences and publications, including a collective monograph co-published by Unesco[1] and presented as a side-issue of Habitat III (fr.wikipedia.org/wiki/Habitat_III).
Activities launched in COOPERA will be pursued through executive issues 1, 2 and 4 of LE CARE-IJL.

LMDCZ (2017-2018) : In 2017, CARE has lead the “Lower Mekong Delta Coastal Zone” project. This project aimed at evaluating risks of coastal erosion for the whole Mekong delta with some focuses on two provinces to provide engineering proposals. The initiative was funded by AFD -EU and under the scientific coordination of Patrick Marchesiello, assigned in CARE lab during this period (1.2M€, PI. Patrick Marchesiello, LEGOS and SanDinh, SIWRR). It gathers 11 international experts (among which two colleagues from LOTUS IJL) and 23 vietnameses experts. Activities launched in LMDCZ will be pursued through executive issues 3 of LE CARE-IJL. The final report is available on lmdcz.siwrr.org.vn/274/ket-qua ; publications are now under review.
Activities launched in LMDCZ will be pursued through executive issues 3 and 4 of LE CARE-IJL.

And next …

[1] en.unesco.org/news/emblematic-megacities-address-threats-climate-change -their-water-related-needs

Globally, CARE had good rate of success on calls and won a top ranking EU project. With LE CARE-IJL we will dedicated some time (and small budget) for writing retreat to improve our chance of success for a new top ranking project.

IsotopeLECZ (July 2018-2022 ; funded by IAEA (35k€), N.P.Dan, S.Tweed): Two companion projects will examine the complex links between surface and underground waters. The overall results will contribute to assessing the sustainability of water use in the delta, for both surface water and groundwater resources. IsotopeLECZ will very probably serve as incubator for bigger projects:

IsotopeSaigon focuses on the Saigon river and the urbanized section of the LECZ, around Ho Chi Minh City (>10 M Inhabitants). The local precipitation, river's water and the groundwater will be collected at both monthly- and seasonal-scale frequencies. In parallel, isotope analysis of nitrate will be used to highlight nitrogen sources in the groundwater and river water resources. These results will be used to improve our understanding of processes resulting on the degradation of the Sai Gon River water quality, which is a major supply of drinking water for Ho Chi Minh City.

IsotopeMekong focuses on the Mekong delta. It uses a similar methodology than **IsotopeSaigon**. The acquired data will be used in the IAEA Water Balance Model with Isotopes (IWBMIso) to constrain the river and groundwater interactions. In parallel our numerical groundwater flow model developed for the system will be improved by using the results of this isotopes study.

CHRONO-RISK (2019-2021 ; ANR (680k€), S.Tweed, to be resubmitted) : This project is leaded by Sarah Tweed (CR-IRD, G-Eau) and was proposed this year for the 1st time to AAPG-ANR2018 (not yet funded). It focuses on the residence time of pesticides in waters of irrigation areas and risks to human health. The area of interest is at the border between Cambodia and Vietnam ; a location where CARE laboratory already did some investigations on the impact of Arsenic on water contamination (1st PhD thesis of CARE lab. Hai Van Phan, defended in 2017). CHRONO-RISK is an ambitious project anchored in the executive issue 4, with strong support of executive issues 1 and 2. It will be re-submitted next year.

MOVINDELTAS (2019-2024 ; ANR and EU/H2020, in prep.(1 to 3M€), S.Fanchette, F.Durand): In continuity to LMDCZ, some partners of LE CARE-IJL (issues 3 and 4) are involved in MOVINDELTAS (Migration as an Adaptive Strategy to Climate Change in Asian deltas, PI. S.Fanchette). This project aims at understanding human dynamics under global changes in Mekong and Ganges Brahmaputra LECZs. The project will be submitted to ANR french agency in June (call to MRSEI:Montage de Réseau Scientifique Européen ou Internationaux). S.Fanchette and contributors targets a submission to H2020 - "LC-CLA-05-2019 - Human dynamics of climate changes", with a deadline the 19th of february 2019.

In short, LE CARE-IJL wishes to obtain a label “IJL” that provides a better visibility locally, regionally and in French related structures. Strongly co-funded from partners, CARE provides an international center on water, which serves as a hub to stimulate inter-faculties researches on key-issues for Ho Chi Minh City, and the Mekong Delta in particular. Such an holistic approach is crucial, in particular to understand the functioning, services and hazards of the critical zone in the Low Elevation Coastal Zone.

CARE is ideally situated to complete IRD IJLs in the region: some collaborations are already engaged since 2015 with IJL LUSES (field trip in 2015 and 2017, conferences, publications) and with IJL “LOTUS” (since 2017 with data exchanges and co-publications submitted). CARE is also targeting some effective collaborations with IJL researchers from G-Eau (and Cambodian ITC partners). They are ideally located to deploy some activities at the border between Vietnam and Cambodia in a more efficient way than what we have done during the 1st phase of existence (executive issue 5 on Arsenic).

The engaged partnership between CARE and the private sectors will strengthen opportunities to obtain funds from international development finance institutions, such as Asiatic Bank for the Development, World Bank and/or AFD.

Organization and governance:

For the coming years, we will be organised within three axis (main societal issues) that target five executive issues (Fig. 1).

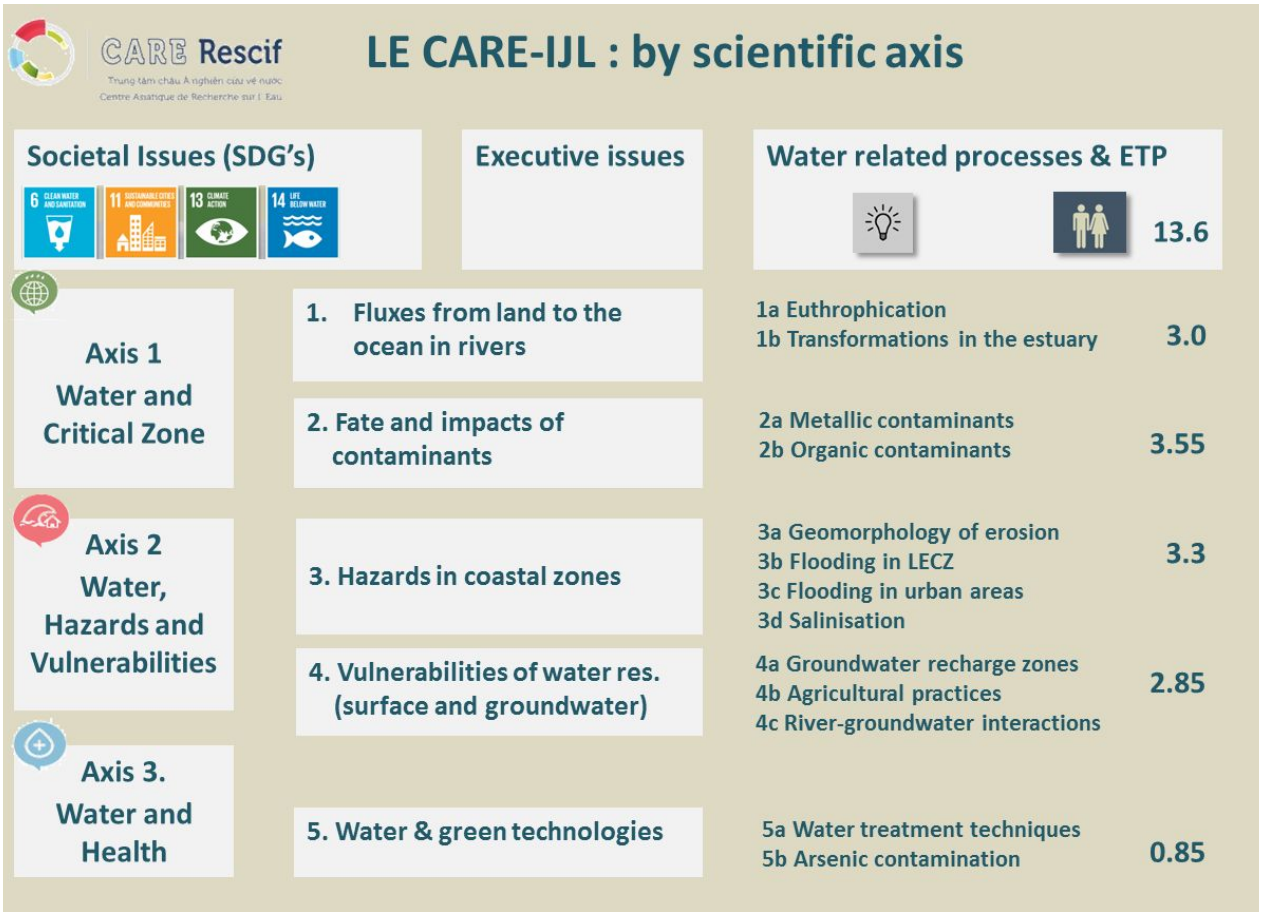


Fig. 1. Backbone of LE CARE-IJL by axis, issues , water related processes studied and men.months

The functioning and governance proposed below benefit from our 5 years incubation experience

- **Executive board (EB)**: the two co-directors, with the help of a Vice-director (for administration tasks) **will meet each week** at CARE for discussion on current events, weekly organization, and, if necessary for works needing decisions, such as budget, projects etc. Any members of CARE could address current questions to the EB during the year (or if the EB needs to address some question to a member). If a special meeting is required, it will be organized.
- **Laboratory council (LC)** consists of the executive board, the representatives of the HCMUT Faculties involved in LE CARE-IJL (Deans and/or vice deans), a representative of the main french labs (UMRs "partenaires principaux"), and all permanent scientists involved in CARE. The council is in charge of discussing on day to day life, on annual events that needs organization, or any general subject related to the lab. LC **will meet twice a year**. First in March, for the presentation of research projects that are applying to the Yearly Internal Project Proposal (**YIPP**, described here after). The Laboratory Council will be announced two weeks before, with a preliminary list of the subjects that will be presented. This list will be send to large email list (EB, HCMUT Faculty Deans, direction of UMRs, permanent scientists). The LC members could introduce other subject of interest. If necessary, a visio-conference will be activated. Second, in September, to evaluate the results of the projects and to prepare the next year.

- ➢ **Yearly Internal Project Proposal (YIPP**, 20,000 USD): A part of the HCMUT money is the "seed money". The objective of this internal call is to stimulate research in and between faculties and to promote international collaborations. All faculties can apply. This internal call for project is operating successfully since 2015 (see **Table A6b in Appendix 6**)
- ➢ **Yearly Scientific Meeting (YSM)** of 1.5 day for restitution of scientific projects and results of student internship. This meeting is open to LE CARE-IJL donors(French Consulate and companies) which can exchange some ideas and propose some specific actions of collaboration. It is coupled with the second LC that holds in September.

The activities of CARE laboratory – and the future research impulse by the LE CARE-IJL project- are -and will be- presented on the web site of CARE (carerescif.hcmut.edu.vn).

2. Project description

South of Vietnam Low Elevation Coastal Zones (LECZ) under pressure

LE CARE-IJL aims at better understanding the evolution of water resources in the Low Elevation Coastal Zone (LECZ) in South of Vietnam. LECZ is defined as the contiguous and hydrologically connected zone of land along the coast that is less than ten meters above sea level. It was introduced a decade ago by geographers, economists and demographers, as a simple tool to study future coastal population growth and exposure (Neumann et al., 2015). Nowadays, LECZ gathers more than 50% of world's population (World bank, 2015). Most of the world's megacities are located in the coastal zone and many of these are situated in large deltas, where combinations of specific economic, geographic and historical conditions to date attract people and drive coastal migration LECZ is vital, not only for humanity but also for environmental and biologic activities (Ramesh et al., 2015).

In the early 21th century, the LECZ faces very rapid changes in South East of Asia and particularly in the south of Vietnam, where Climate and Human related changes are exacerbated. The Saigon-Dong Nai rivers and Mekong delta systems are two intrinsically linked hydrological systems that focus our attention. It concentrates 27% of Vietnam population and 20% of PIB. It is the 2nd widest deltaic zone in the world and acts as a regional hub for agriculture and aquaculture productions.

The Vietnamese authorities and citizens have no choice to adapt their water resources management to guarantee the food, environmental and economic security of 25 millions of inhabitants, who live there, by answering to three societal issues :

1. What is the current (and coming) level of pollution surface waters and how it impacts people?
2. Is the Mekong delta region able to keep pace with coastal erosion, flooding and salinisation?
3. How engineering techniques can provide solutions to reduce risks and adapt to the new paradigm?

Addressing these three questions is at the heart of our motivation

Description of the objectives by "executive issues": LE CARE-IJL apprehends these three societal issues through five executive issues, which focus on 1) river water quality 2) water contamination by human activities, water-related hazards in 3) the coastal zone, 4) and for groundwater and 5) the potentiality of green technologies to mitigate risks.

It is clear that the executive issues are inter-connected. As examples, sediments transportation can also be a vector for contamination of organic or metallic contaminants. A flooding can affect the quality of the surface water. A recharge zone for groundwater can be studied in terms of quantity, but also in terms of quality. Several issues will work on the same experimental sites (detailed in Fig. 2).

Below, we describe each executive issue, detailing the state of art, the current knowledge gaps coming from our previous works or known situations, the main scientific questions attached, and the "tools" we will use to contribute to answer to those questions: methods (field and modelling), experimental sites, monitoring surveys, and for some of them the current or plan project funding.

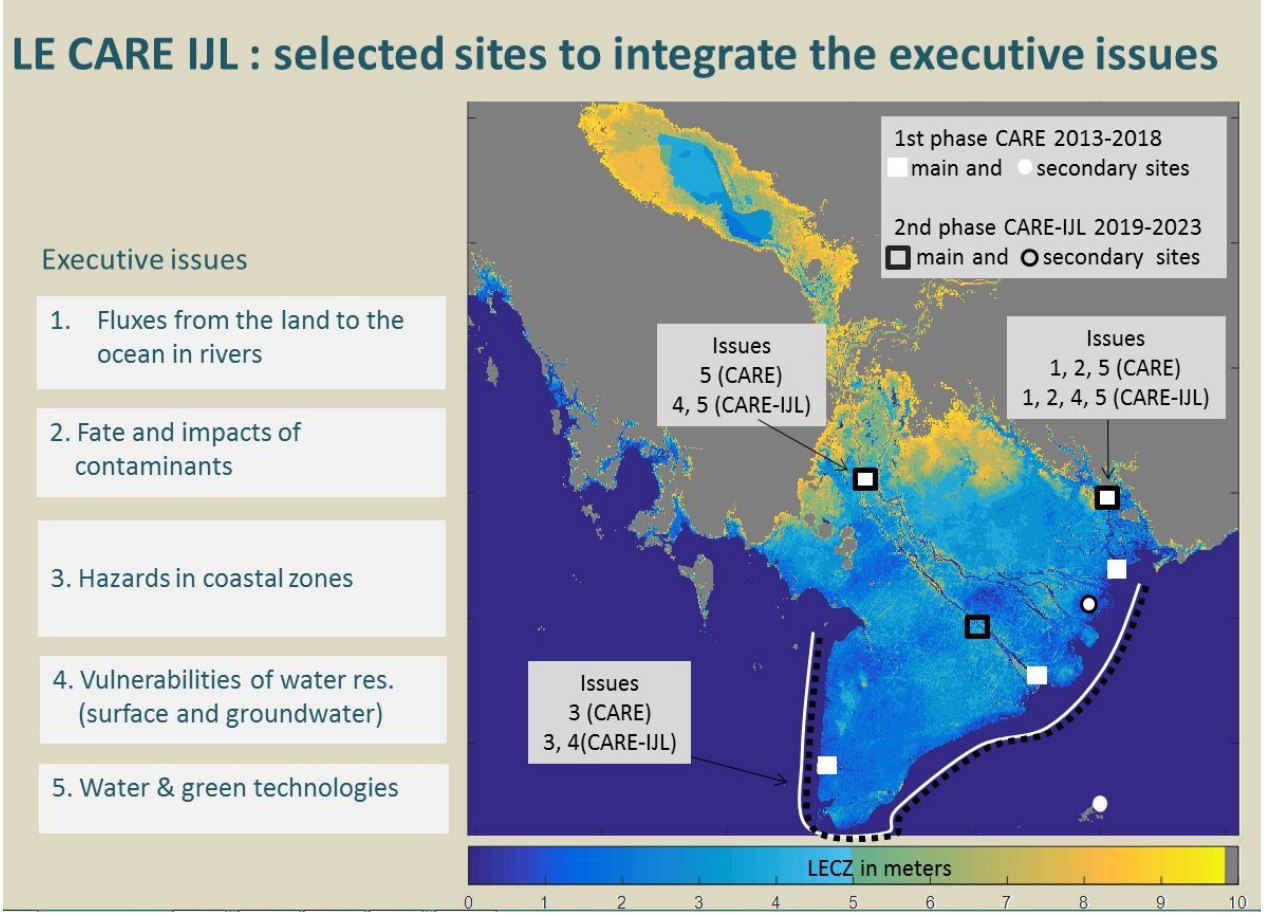


Fig. 2.Delimitation of the LECZ in south of Vietnam and presentation of former and future study sites.

Issue 1: Surface fluxes from land to ocean in rivers : transformation, evolution and impacts (PI: Julien Némery and Dao Son)

Main state of the art: Nutrients fluxes from land to ocean are strongly modified by human activities (urban, agriculture and industries). At the global scale South East Asia is a prominent hot spot of nutrients export due to high runoff under tropical climate and large human pressures (Seitzinger et al., 2010). Due to recent economic and population growth in Vietnam***,*** chronic eutrophication is a worrying topic, particularly in Ho Chi Minh City. Eutrophication is defined as an increase in the rate of organic matter (derived from the nutrients enrichment) to an ecosystem (Nixon, 1995), which cause the negative effects on the water quality and aquatic life. Eutrophication may lead to algal blooms, and the decomposition of organic matter from dead algae enhance the oxygen depletion in aquatic systems, causing problems such as the regional fish death, changes in ecological structure in benthic fauna, flora and phytoplankton composition (Howarth et al., 2006). Moreover, eutrophication can facilitate the toxin algae development which accumulated in fish, shellfish and affect drinkable water production and human health via seafood consumption (Heisler et al., 2008).

Current knowledge gaps and attached scientific question(s): Before reaching to the ocean, the upstream nutrient fluxes pass through estuaries environments, which play a role for nutrient removal and retention (Regnier et al., 2013). The tidal estuarine systems are more polluted than others and are

designed a key compound in the transformation of loads from land to ocean (Mayorga et al., 2010). Tidal estuaries, such as Saigon River, are thus highly vulnerable to eutrophication. In these environments, there is a challenge in assessing the amount and ratio of nutrients as an indicator of estuarine coastal eutrophication (Billen et al., 2007). The nutrients ratio in aquatic system is an important key to assess which element will become the limiting factor and has to be controlled to reduce algal blooms.
Along the estuarine gradient, nutrient inputs are modified by a complex interplay between hydrodynamic, sediment interaction, geochemical and biological processes derived from wind, light, water temperature, tides or freshwater discharge (Regnier et al., 2013). Understanding the processes which control the nutrient dynamics along the salinity gradient of estuary is essential to evaluate the risk of eutrophication. To achieve this objective, numerical modelling will help examining the biogeochemical transformations within estuary and assessing the buffer role of estuary in the nutrients emissions from land to coastal areas.

Material and Methods: There exists various numerical models of nutrient dynamics such as “Box models” which simulated the estuary as a single, vertically and horizontally well-mixed box with steady residual hydrodynamic characteristics (Garnier et al., 2010) ; “Reactive transport models” (RTMs) which were the quantitative tools for disentangling the complex biogeochemical transformations and fluxes in coastal environments (Arndt et al., 2011); “River Strahler model” which describes the biological and physicochemical processes (applied mainly for European basins, but also one application in the Red River, Vietnam) (Le et al., 2015).
Recently, Carbon-Generic Estuary Model (C-GEM), one-dimensional, generic reactive-transport model for the biogeochemical dynamics of carbon and associated bio-elements (N, P, Silica) was developed for estuaries. C-GEM uses an idealized representation of the estuarine geometry to support hydrodynamic calculations and provide accurate description of the transport of nutrients and the biogeochemical reaction processes (Volta et al., 2016). Based on its strength of the nutrient dynamics representation in estuarine system, C-GEM is chosen to be implemented in the Saigon river estuary. This work will be conducted has part of a master and a Phd work (see Appendix 8b), in close collaboration with scientists from UMR METIS (Milieux environnementaux, transferts et interactions dans les hydrosystèmes et les sols).

Expected outcomes: Recent studies of our group in CARE have highlighted the extreme degradation of water quality in response to Ho Chi Minh City waste waters releases (Strady et al. 2017; Nguyen 2018 ; Nguyen et al., in prep.). Modeling approach is then needed to help stakeholders and managers to implement remediation strategies to improve water quality. The expected outcomes of the project using C-GEM model are to : i) assess the risk of eutrophication in Saigon river and downstream areas ; ii) quantify the buffer capacity (nutrient removal) of Saigon river estuary in regards to the nutrient fluxes from agricultural, industrial and domestic wastewaters around HCMC and iii) propose eutrophication mitigation in the future based on three scenarios: (a) the increase of population, industry, and agriculture; (b) new policies for agricultural practices and wastewater discharge reduction; (c) climate change and increase of sea level and saline intrusion. The model integrates many aspects of hydrological cycles (interaction with groundwaters and surface waters) and sources and fate of sediments and any kind of pollutants (mineral or organic). This integrated tool can thus be used for others application within the LE CARE-IJL.

More generally, many coastal megacities in the South East of Asia are putting some alarming pressure on the estuarine and coastal environments. The development of such a modelling approach could be then duplicated in other case study in the near future as part of collaboration with IJL.

Project funding: the project takes place in the continuation of COOPERA project (Saigon River: la ville et le fleuve, 2013-2017, see section Past and current fund raising from projects) in the framework of which a PhD is ongoing (Nguyen 2018). Four others related projects are ongoing or under submission:

- EC2CO-Bioeffect (2017-2018) entitled “Particulate nutrients transformation within the salinity of a tidal river” dealing with acquisition of field data in the salinity gradient, laboratory experiment and preliminary implementation of the model C-GEM (collaboration with METIS/University Sorbonnes, with high expertise in biogeochemical modeling). One Vietnamese student (Nguyen Truong An) has obtained a master 2 grant from French embassy to work on the implementation of the model in 2018 in

IGE and will pursue in Phd thesis (2018-2021- see appendix 8b, grant attribution to CARE lab by Grenoble INP).

- IAEA projects IsotopeSaigon (2018-2022) “Groundwater contributions to the Sai Gon River and implications for the degradation of drinking water supplies for Ho Chi Minh City, Vietnam” is now accepted. It will help to calibrate the C-GEM model (connections with issue 4).
- CNES-TOSCA project 2019-2021 entitled : « Apport des mesures du futur satellite SWOT : étude de faisabilité pour l’analyse des flux de nutriments et de sédiments dans la rivière Saigon (Vietnam) » is submitted to evaluate the feasibility of river discharge estimation from remote sensing techniques.
- LEFFE and/or EC2CO projects will be submitted to finance field surveys and validate model scenarii.

People involved: *Julien Némery, Dao Son, Nicolas Gratiot, Tuyet Nguyen, Nguyen Truong An, Nguyen Thong and collaborators Josette Garnier, Vincent Thieu*

Issue 2: Fate and impact of organic and inorganic contaminants in surface waters (PI : Christine Baduel and Nguyen Phuoc Dan)

Main state of the art: Saigon and downstream Dong Nai Rivers are the major sources of domestic water for Ho Chi Minh City. The good quality of their surface waters is therefore becoming a crucial issue, in a context of increasing industrial and urban effluents towards the rivers. Trace metals and organic Contaminants of Emerging Concern (CECs), (including pesticides, pharmaceuticals and personal care products, hormones, flame retardants, perfluoroalkyl compounds), released in surface water are capable of causing detrimental effects to the aquatic organisms raising the risk of ecotoxicological impact. Metals and CECs in the aquatic environment originate from a broad range of sources including wastewater discharge, agricultural runoff, landfill runoff, PPCP manufacturing sites, and aquaculture. Once released into surface water, they may undergo long-range transport depending on their physicochemical properties and on the characteristics of the receiving environment. The megacity of Ho Chi Minh City, including the Saigon and Dong Nai Rivers, gathers all possible sources of metals and CECs. This city, declared as the 2nd most dynamic city in the world (Word Economic Forum general assembly, 2017) exerts a high environmental pressure on the water quality (Strady et al., 2017). Moreover, environmental management is very limited and only 10 % of the total municipal wastewater and 20%-50% of the industrial wastewater are treated before being discharged into the river (Marcotullio, 2007[2]). The intensification of aquaculture and agriculture activities in the region may lead to the increased release of CECs such as pharmaceuticals and endocrine disruptor compounds into the river.

Current knowledge gaps and related scientific question(s): While most studies on CECs have so far been conducted in North American and European countries, there is a strong deficit of such studies in developing countries. Beyond different water management policies, recent studies have shown that the environmental fate and behavior of contaminants may differ between temperate and tropical zones, in terms of degradation, transport and ecotoxicity. In tropical environment, very little is known about the CECs profile, their sources, their temporal variability (e.g. seasonal cycle, long-term trends) in the various aquatic environmental compartments (e.g. water, sediments) and their impact on biota and on the food chain. The first objective will be to obtain a better knowledge of the quality of the water regarding CECs through an exhaustive chemical diagnosis of emerging contaminants’ presence and to characterize their spatial and temporal occurrences. The second objective will be to improve the knowledge regarding the sources, the reactivity and the impact of trace metals and CECs in the aquatic environment.

Material and Methods: As the sampling strategy developed for trace metals and nutrients studies from 2013 until 2018, snapshot campaigns will be conducted for CECs in the lower Saigon-Dong Nai River watershed during contrasted season, dry and rainy (Strady et al., 2017). The water quality monitoring, settled in 2015 will be continued and completed with CECs from 2019. Snapshot campaign will be also

[2] see also the recent paper news saigoneer.com/saigon-news/13623-saigon-aims-to-treat-90-of-wastewater-by-2020

organized to identify the sources of trace metals and CECs (commonly with nutrients) in domestic and industrial wastewater treatment plant, in aquaculture effluents or in landfill runoff. Concerning CECs, integrated sampling strategies for suspended particulate matters (SPM) and surface waters will be deployed to assess time-integrated concentration of organic pollutants in water and suspended particuate matter (SPM) respectively. Chemical analyses will be performed using state-of-this-art mass spectrometry techniques including target and non-target strategies. Geophysical tools used in Issue 4 (groundwater) could be adapted to evaluate thicknesses of sediments layers.

Expected outcomes: Over the next three years, the expected outcomes we will be to establish a baseline for understanding river contamination for a broad range of CECs. In particular, we will achieve the description of their occurrence and concentration over the snapshot campaigns to assess seasonal and spatial variabilities. Prioritization of which CECs require further studies will be assessed based on different criteria such as persistence, spatial and temporal occurrence, toxicity, concentrations and lack of knowledge of the micropollutants. The second outcome will be the identification of their reactivity (identification of degradation products) and the description of their fate along the river and the littoral environment. Another important outcome will be the initiation of a specimen bank for environmental and biological matrices from Vietnam for future research. The specimen banks will be an important tool for further extended chemical characterization, toxicological testing and retrospective analysis of emerging contaminants as research questions emerge and it will allow the study of time trends as well as the evaluation of new environmental management practices (implementation of wastewater treatment plants etc.) over time. We also expect to identify the sources of trace metals and CECs in the river.

Project funding: projects are under preparation for EC2CO and Veolia foundation and will be submitted in September 2018 and they will be fully dedicated to this issue. Note that CECs is a new topic that will be studied by C.Baduel (CR2 IRD since 2017). She will come two months in Nov-Dec 2018 to consolidate her work with the local team.
People involved: Christine Baduel, Le Thi Minh Tam, Nguyen Phuoc Dan, Emilie Strady, Nguyen Thien Kim, Jean Martins, Lorenzo Spadini

Issue 3: Hazard in coastal zones ; risks for urban and rural areas (PI : Patrick Marchesiello, Nguyen Thong and Ho Tuan Duc)

Main state of the art: Risks of erosion / Flooding / Salinization : The LECZ of southern Vietnam is emblematic of the coastal problems encountered in tropical delta regions. This coastal zone has been generated by very large sedimentary fluxes eroded in mountain watersheds at geological time scale, but modulated by oceanic waves and currents, which, in combination, redistribute the river intake to the southwest. This process has formed the southern tip of Vietnam for the last 3500 years. But now, in addition to natural forces, the LECZ is affected by local human activity, including land subsidence, reduction of river fluxes due to damming and sand mining, and reduction of protective coastal mangroves in favor of agriculture and aquaculture. Relative sea level rise is a major challenge, although global warming is a minor factor in the current situation when compared with land subsidence due to groundwater extraction.

Current knowledge gaps and attached scientific questions : Discussions on various aspects of coastal science was proposed based on questions that emerged from our previous projects (Marchesiello and Dinh, 2017, Marchesiello et al., 2018): what are the actual erosion rates? what are the paradigms needed for understanding coastal vulnerability (erosion/flooding/salinization) and protection measures in delta coastal zones? Therefore, our objectives are: 1) better assessing erosion rates and areas suffering frequent flooding 2) Assessing the hierarchy of causality for observed erosion and flood patterns 3) proposing engineering solutions. However, an important issue for IRD is how we handle the gap between science and coastal engineering as researchers?
Sometimes, solutions for one problem (protection against erosion/flooding/salinization) can even be detrimental to the others. The theory states that retention of upstream sediments due to damming should result in river bank erosion before coastal erosion occurs; but in this case, stabilisation of river banks may

negatively affect the coastal zone. In another example, protection from flooding may seem appropriate for some activities but also detrimental for fertilization of the delta plain. An important aspect of all these problems is groundwater extraction (Issue 4). It is an important factor of increased salinization and also a factor of increased erosion and flooding. Interestingly, recent satellite analysis show that increased flooding due to land subsidence can coexist with continuing shoreline advance in estuarine zones as long as sediment is supplied in this area, forming ridges. Salinization is highly dependent on the balance between river discharge and tidal fluxes, but also as we said on groundwater extraction. Countermeasure for coastal erosion are not necessarily appropriate for the salinization problem. This type of discussion shows how an integrated approach might be important to address coastal problems. Integrating the land-ocean continuum is part of this approach. It should also include sociological studies as risks and problems are often biased by perception. Local and scientific knowledge need to be better evaluated and compared, but eventually an objective evaluation of all risks should be estimated for a sustainable development to be possible.

Project funding, material and methods : A recent large project on the coastal Mekong delta erosion (LMDCZ-AFD) has officially ended last January 2018 but the scientific results are still being analyzed and prepared for publication (see section Past and current fund raising from projects). This project was officially proposed by AFD (Agence Française de Developpement) to the European Union (Department DEVCO for development and cooperation) and was awarded 1.2 M€. It was a scientific study of erosion and test of proposed solutions to stabilize two coastal sites (Go Cong and Phu Tan), as a preliminary step before actual construction of countermeasures. This project involves many experts in Vietnam and outside and was important in identifying and gathering Vietnamese partners of various background (mainly at SIWRR and HCMUT/CARE but with a network of satellite institutes frequently associated in their research). IRD was greatly involved in this project with 4 experts, one of whom assumed the role of scientific leader for the project. Important results were obtained during the project but they also highlighted the need for an integrated approach as explained above.
The project's methodologie gave much space to numerical models, but included a large panel of other methods: in-situ sampling; remote sensing from satellites and coastal cameras; laboratory analysis and sample testing; compilation and analysis of existing data; physical laboratory modeling. All this was used for better assessment of erosion rates and sediment characteristics and fluxes and eventually to validate models for assessing erosion processes and for testing countermeasures to erosion. One missing element, which was completed on the basis of recently published results, was land subsidence. This point is related to the Issue 4 of this proposal: *Hazard in groundwater resources*. Another weak element was the evaluation of submerged delta bathymetry. Video cameras will provide some elements (and has already given interesting results for the Go Cong coast), but satellite sensing should provide a coherent picture of the whole coastal delta. Such methods are being developed at LEGOS with ESA funding. The vietnamese partners at SIWRR and CARE are giving particular attention to local numerical models for coastal and estuarine problems. These models are also used for salinization (including forecasting) and flood risk assessment projects. During the LMDCZ-AFD project, efforts at better structuring the Vietnamese modeling community were made and should be profitable to continuing projects.
Jointly to this erosion project, a smaller project (30k€, 8 people) funded by AUF allowed us to study flood risk in the highly vulnerable region of Ho Chi Minh City. For the first time, this project considered people's perception and the means of mitigation and adaptation. These two projects provide a strong basis for elaborating the H2020 project **MOVINDELTAS** (PI. S.Fanchette, described previously).

People involved: *Patrick Marchesiello, Nguyen Thong, Rachid Benshilla, Rafael Almar, Isabelle Ruin, Thu Trang Ngo, Tran Ngoc Tien Dung*

Issue 4: Vulnerabilities of natural water resources (PI: Marc Descloitres, Sarah Tweed and Tu Tran Anh)

Current state of issues and knowledge gaps: The future sustainability of the LECZ's rural and urban communities hinges on a more integrated water resource management strategy with a comprehensive

understanding of surface-groundwater interactions and the transfers of pollutants in the groundwater system. Indeed, groundwater resources in the LECZ are intensively pumped for agricultural, industrial and domestic uses resulting in decreased hydraulic heads, creating a significant hazard with land subsidence and therefore possible vulnerability for seawater intrusion (Erban et al, 2014; Minderhoud et al, 2017). Exchanges between surface water and groundwater can create a hazard in the low-lying flat areas. In the border region with Cambodia, arsenic is also present (Van Phan et al, 2017), and the recent expansion of irrigated areas with intensive pesticide applications have caused an unprecedented risk to human health via groundwater contamination (McLaughlin and Kinzelbach, 2015; Yadav et al, 2015). The spatio-temporal dynamics of pollutant cycling between groundwater and surface waters remain yet to be systematically analysed regarding dynamic hydro(geological processes, biogeochemical controls (Tweed et al, 2011), and irrigation practices (Alletto et al, 2010). In other areas there is a lack of aquifer productivity just East of HCM City related with irrigation needs for tea and coffee plantations in hard rock systems. At last, groundwater uptakes for HCM City needs (30% of the domestic water) as well as agriculture needs in the delta rely on shallow (0-100m) and deeper (100-300m) aquifers that are thought to be separated by inter-stratifying clayey layers with no evidence of their continuity, creating a possible vulnerability to pollutants. These knowledge gaps reflect a lack of comprehensive information on groundwater resources and related recharge processes.

Current knowledge gaps and attached scientific questions:

1. In the Mekong Delta, what are the surface water-aquifer interactions, the different modalities of irrigation, water resource management and agricultural practices affecting the transfer of pesticides to the water table?
2. What are the risks of contamination/salinization for shallow groundwater resources?
3. In the surroundings of HCM City, what are the aquifer resources in the sedimentary and hard rock hydrogeological systems? Can they respond to future demands? What are the hazards related to the main recharge zones: are they vulnerable to pollution, and how are river-aquifer and aquifer-aquifer relationships affecting water resource vulnerability?

Material and Methods: Our approach is based on three experimental sites: The first site is in the heart of the LECZ of south of Vietnam, at the border with Cambodia (see Fig.X). We will take benefit of two contrasted irrigation situations to investigate water dynamics: in Vietnam, irrigation works have supported intensive agriculture for decades whilst in Cambodia, the flood plains are still little reclaimed. The second experimental site will be settle in the Vietnamese provinces of Ben Tre and Tra Vinh, close to coastline within the Delta, where salinization takes place and possibly increases with time. The third experimental site is to analyse the hazards in recharge zones at the pumping field north of HCM City to highlight the connections between shallow and deeper aquifer systems, and with the Saigon river which is cross-cutting the shallower aquifer. We will propose an interdisciplinary approach that includes hydro(geological, geophysical and hydrochemical modelling. Hydrochemistry includes contaminant modelling and the use of environmental tracers which can help differentiate groundwater recently recharged with well-mixed deeper groundwater and sea water intrusion. We will use resistivity geophysical methods well suited or clayey and salinization investigations and Magnetic Resonance Sounding and bore-hole logging. This site and issue is clearly in connection with issue 2 on contaminants: we will benefit from their approach.

Expected outcomes and current project funding initiatives **:** The main expected outcome is *to define efficient and robust methodologies for evaluating groundwater resources hazard in the delta*. We will also benefited from a IRD JEAI submitted in 2018 by researchers from ITC (Institute of Technology in Cambodia) which will involve scientists from this IJL and will establish mirror experimental sites in Cambodia.[d3] . We already started to seek for funds:

- The first initiative is a VNU internal project proposal written and leaded by Vietnamese scientists that targets the recharge zone at the north of HCM City (PI Tu Tran Anh, with M.Descloitres and S.Tweed)

for 2019. This project addresses question 2 of our executive issue: are the aquifers recharge zones vulnerable to pollution?.

- The second initiative is an ANR French call **CHRONO-RISK** "Residence time of pesticides in waters of irrigation areas and risks to human health" (PI. Sarah Tweed with 8 scientists from issues 1, 2 and 4) already presented in 2018 (but not funded yet: and involves several scientists of this IJL consortium This project addresses question 1 of our executive, with the objective to model the pesticide transfer processes and consequences for water resource vulnerability and health risks in a transboundary water system.
- Thirdly, there are two initiatives in response to an IAEA coordinated research grant leaded by Vietnamese scientists; 1. "Groundwater contributions to the Sai Gon River and implications for the degradation of drinking water supplies for Ho Chi Minh City, Vietnam" and 2. "Improving our understanding of groundwater and river interactions in the lower Mekong Delta (Vietnam) through the use of isotopes." These projects involve IJL consortium scientists (Dan, Gratiot, Tweed, Massuel, Leblanc, Nemery, Baduel, Strady). It will model groundwater and surface water interactions through the use of environmental tracers.
- Lastly several geophysical training schools are initiated with Grenoble Labex OSUG@2020 in 2018 and 2019 (See appendix 12).

People involved: Tu Tran Anh, Phong, Dang Thuong Huyen, Dong Uyen Thanh, Marc Descloitres, Sarah Tweed, Sylvain Massuel, Marc Leblanc, Anatoly Legchenko.

Issue 5: Water Quality and Green Technologies (PI Bui Xuan Thanh, K. Schonengerger, Pierre Rossi)

Current state of issues: The rapid industrialization and urbanization in Vietnam has resulted in the following issues relating to water quality degradation and wastewater pollution: (i) Contamination of nutrients, herbicides/pesticides and trace organics were found in upstream areas due to aquaculture/ agriculture activities; (ii) Serious surface and underground water pollution in terms of trace metals (such as As) trace refractory organics in downstream area; (iii) Under negative impacts of climate changes, saltwater intrusion, lack of freshwater in the dry season strongly happen in the coastal areas, (iv) People living in the rural and suburban areas who can not access to piped water, use other sources such as shallow wells that do not meet quality standards; (iv) Conventional water treatment facilities do not produce water with acceptable standards because of poor design and construction, and inadequate operation and maintenance (Trang et al. 2012; 2014; Tam et al, 2016; Cornelis et al, 2016; Strady et, al. 2017).
Despite these impressive amendments, urban sanitation still faced critical issues (i) Only ten percent of municipal wastewater is treated, (ii) 90 percent of households having septic tanks, but only four percent of septage is treated, (iii) Fecal sludge management is generally poor in most cities. (iv) Resource recovery from sludge or reuse of treated wastewater are not currently given high priority and (v) Wastewater from small and medium-sized enterprises have not been well managed.

Scientific questions: The research questions to solve the current water issues involving the followings: (i) What are suitable water treatment technologies for removal of trace pollutants such as herbicides/pesticides, Endocrine Disrupting Compounds (EDCs) and trace metals (arsenic, cadmium, lead, etc.); (ii) What are technical measurements to enhance efficient performance of water and wastewater treatment plants?; (iii) What are desalination technologies that are feasible in terms of low cost investment/O&M costs, simple operation and applicable in the coastal areas (iv) How can we promote use of the green technologies for waste treatment or remediation of contaminated sites, in terms of recovery of valuable nutrients, renewable energy production, water saving, or low energy consumption and less chemical use? (v) What kind of engineering techniques can provide solutions to reuse water and reduce the risk for water consumption?

Material and Methods : In order to answer the scientific questions, the following potential approaches are proposed: (i) set-up on-site surveys for water quality of rivers or aquifers and then water quality and

hydraulic modelling may be applied for determine original sources of pollutants and afterward finding out the measurements of pollution prevention using natural treatment or phytoremediation or low-cost treatment (direct links with issues 1 and 2) (ii) Experiments of removing pollutant/trace pollutants from contaminated surface/underground water will be designed and then the lab-scale and pilot-scale experiments will be run to find out the feasible techniques to reduce human health risks (iii) Lab-scale and pilot-scale experiments for desalination, green technologies or wastewater reuse/reclamation will be set-up and run to determine the optimum design parameters in order to reduce costs, energy and chemical consumptions (iv) Rain water collection, storage and reuse is considered as a feasible approach to adapt to climate change in a flexible way.

Expected outcomes and project funding : the expected outcomes of the researches are to find out the technical options and management tools for water and wastewater pollution controls, water reuse, carbon and nutrient recovery from wastes to meet the sustainable development in the target study areas. There is a wide panel of financial supports that are and will be solicited to fulfill our objectives : (i) Vietnam National University-Ho Chi Minh (HCMVNU); (ii) governmental institutions such as Provincial Departments/Ministry of Science and Technology, Department of Natural Resources and Environment, etc. (iii) International institutions (from Japan, Switzerland, France, Korea and Belgium) (iv) and private sectors such as Greentech Company, VUCICO-Vietnam and Duong Nhat company.

People involved: Nguyen Phuoc Dan, Bui Xuan Thanh, Dinh Quoc Tuc, Hai Van Phan, Le Thi Minh Tam and Huynh Khanh An, Pierre Rossi, Philipe Sechet

Open minded to other opportunity : In addition to the above five executive issues, the current scientific collaborations could lead to the following opportunities to collaborate:

- Continental hydrology and sediment fluxes of the Lower Mekong Delta at regional scale, from Lao to Vietnam. After the writing of ANR MESKONG (2016, not accepted), various collaborations were initiated through small funding. Some collaborations are already on-going with colleagues from from GET through the Critical Zone Observatories HYBAM and M-Tropics (Legout et al., 2016 ; Le et al., 2018) and LUSES for the monitoring of water quality along the upstream fluvial system and the developpement of remote sensing tools etc. LOG (Tosca project, joint field trip in Tonle Sap in sept 2018), LERMA (French Embassy project, working visit in june 2018), GET (Hybam) laboratories and Didier Josselin (a project is submitted to ZABR).
- The work undertaken in IJL LOTUS on the Red River and the one undertaken in LE CARE-IJL could provide an in-depth intercomparison between the two main hydrosystems of Vietnam.
- Activities on groundwater resources with Cambodian ITC (Phnom Penh) partners from G-Eau UMRs, will very probably be reinforced in the first years of functioning. At mid-stage (2021), a formal regionalisation of LE CARE-IJL will be discussed.
- WARM JEAI (2018-2020) : WAter Resources and disaster Management using artificial intelligent systems. The director of WARM JEAI wishes to create a satellite structure in Ho Chi Minh City. A MOU has been signed between WARM and CARE to host a “satellite” structure of WARM in the CARE building.

3. Capacity building and education

Our current implication in education and capacity building has been described previously (section : *Strengths for the completion of LE CARE as an International Joint Laboratory*). Now, we are working on two complementary actions :

- **LE CARE-IJL will propose a new option in PFIEV water** (see details appendix 12): To be in step with its rapid demographic and economic development, Vietnam has needs for water management infrastructure development in cities and watersheds. These needs involve multidisciplinary skills (hydraulics, civil engineering, hydrology, geochemistry). To date, there is no master level program in Vietnam to achieve this range of skills. Two Faculties of Environment and Natural Resources and Civil Engineering of HCMUT together with Grenoble INP are working on the opening of a new master program untitled “Infrastructures de l’eau en milieu urbain”. This program is realized in the framework of the long term academic collaboration between HCMUT and Grenoble INP (PFIEV: Program de Formation d'Ingénieurs d'Excellence au Vietnam). As part as bilateral collaboration between France and Vietnam the PFIEV allows labelling Vietnamese master program through CTI accreditation (Commission des Titres de l’Ingénieur français).
The expectations of this new master program offer in Vietnam are three-fold: to foster research-level collaborations between the LE CARE-IJL partner institutions, to use innovative teaching aids allowing the internationalization of training (MOOC) and to ensure opportunities in the water sector for graduates in a national and international context. Bui Xuan Thanh (associated professor HCMUT in the Environmental faculty) will lead this program together with Julien Némery (associated professor G-INP/ENSE3). The proposed program will be presented to the French PFIEV consortium and will be evaluate by the end of 2018. Expected opening is for September 2019 with about 20 students.
To support the capacity building and to follow-up of the launch of this master, a project has been submitted to the AuRA Region call entitled “cooperation académique internationale”. The two-years project (2019-2020) will fund expertise missions between Vietnam France and also ensure investments for pedagogic platform development (total budget : 38 keuros ; PI J. Némery).

- **Capacity building in Hydrogeophysics .** The faculty of Geology is currently building a Master cycle that include teaching methods for a better assessment of hazards in geology, including groundwater. This Master could be constructed with Japan and Philippine Universities. The tools of Hydrogeophysics in IGE can support this Master. The project is to propose three modules of 40-50 h each with Electrical Tomography, Electromagnetic methods, and Magnetic Resonance Soundings, *with the objective of teaching also for the teachers*. To support those formation actions, which include costly geophysical equipments, funds are necessary. For now, Région Rhône Alpes, Grenoble INP and the LABEX OSUG@2020 project in Grenoble are targeted.

Transfer to operational structures and policy makers : Deeply anchored in the engineering and academic world, LE CARE-IJL as the objective of reinforcing the tryptic *“ research-education-and transfer to the society”* :

- **Operational governmental structures:** Collaboration was initiated (in 2015), and consolidated (with a joint MOU in 2017), between CARE and the Center of Environmental Monitoring (CEM), from the Department of Natural Resources and Environment (DONRE) of the Ho Chi Minh city Province. CEM is in charge of the survey of water quality for the Province. Since 2005 CEM has implemented 26 monitoring stations along the two rivers and 15 in urban canals, allowing the acquisition of bi-monthly data for water quality and monthly data for hydrology at low and high tides. CARE already worked on the analysis of the database (with co-authored conferences and publications in prep.). LE CARE-IJL will go one step further, providing the scientific support to develop an aquatic modelling tool and to design scenarii of water quality restoration (see executive issue 1 for details).
- **Private sector and french diplomacy :** Very recently (spring 2018), we open a dialog with few companies of the water sector to seek efficient ways of collaboration and sponsorships. The initiative was launched jointly with CARE and the French consulate to create some bridges between sectors that are generally separated. Four companies joined our dynamics and will contribute to the fundings of LE CARE-IJL, in case of success (Vucico, Compagnie Nationale du Rhône, Artelia, Vinci and Wality; see appendix 8).

3. CONCLUSION :

LE CARE-IJL a novative joint laboratory to tackle water related issues in the Mekong delta region

The originality of CARE, since its beginning in 2013, was to gather the expertises of forefront North South engineers and academics schools in a unique building facility, to study the rapid changes of the Mekong delta, and imagine robust and innovative ways to adapt to these changes. This originality of approach, coupled with the efforts of all, have been widely rewarded and already leads to : 18 ISI referenced publications, some of them at the edge of some sciences[3] ; the emerging of some innovative science (ex. JEAI plastic under application), technologies (ex. award on membrane techniques) and education tools (ex. MOOC des rivières et des hommes). With over 15 thesis and post-docs and ~100 internships from six nationalities, research training has been the mainstay of this success.

Fréderic Dufour, Vice Presidency Research Grenoble INP, recently summarized the political need of labelizing CARE as a LMI *(full letter is provided in Appendix 7a)*: "*the labellisation would allow Grenoble INP to have a visible argument of recognition to consolidate its political choice of international development in Vietnam with HCMUT. This will facilitate long-term support and allocation of funding and scholarships. This label would also be a strong sign of recognition and encouragement of the involvement and dynamism of researchers and technical and administrative staff in the realization of quality scientific projects and also in the development of CARE on a crucial theme for humanity in the 21st century.*"

Now, it is time to expand the community of scientists involved in our laboratory and anchor CARE oriented capacity building: firstly, LE CARE-IJL will consolidate the french-vietnamese education tools, through PFIEV initiative and hydrogeophysics courses as well as contaminants studies.The objective is to create perennial courses inside HCMUT masters with a north south anchored vision (for hydrogeophysics, equipments should be, at the end, bought by HCMUT). Secondly, LE CARE-IJL will strengthen the existing structure by proposing extension of the core activities started in 2013 with new research domains (in particular on underground water resources and emerging contaminants). As a laboratory, LE CARE-IJL's philosophy is to remain open minded to scientific and entrepreneurship opportunities ; LE CARE-IJL has designed an original and novative mode of governance based on co-funding, which really facilitate the dialog with the private sector and society. Finally, the regional dimension will also be consolidated and a clear scientific link will progressively be anchor with Cambodia (and upstream) through new investigations at the border of the two countries.

[3] see appendix 10 for a complete reference list ; the production now reaches 18 for ISI referenced journals, 31 additional papers in international and national journals , 40 oral presentations in conferences and 15 posters

LIST OF APPENDICES

Appendix 0 List of Acronyms

AFD	Agence Française pour le Développement
CARE	CENTRE ASIATIQUE DE RECHERCHE SUR L'EAU
CECs	Contaminants of Emerging Concern
CEM	Center of Monitoring
C-GEM	Carbon - Generic Estuary Model
CTI	Commission des Titres de l'Ingénieur français
CZ	Critical Zone
DEVCO	European Union (Department for development and cooperation)
DONRE	● Department of Natural Resources and Environment
EDCs	Endocrine Disrupting Compounds
EtuRESCIF	Association de Mobilité Etudiantes du RESCIF
FCE	Faculty of Civil Engineering
FChE	Faculty of Chemical Engineering
FENR	Faculty of Environment and Natural Resources
G- EAU	Gestion de l'Eau, Acteurs et Usages
GEOPET	Faculty of Geology and Petroleum
HCMUT	Ho Chi Minh City University of Technology
HCMVNU	Vietnam National University-Ho Chi Minh
IGE	The Institute for Geosciences and Environmental research
INRA	National Research Institute for Agronomy
IRD	Institut de Recherche pour le Développement
ITC	Institute of Technology in Cambodia
LE - CARE	Low Elevation and Coastal zone in south of vietnam analysis of water Resources and Evolution
LEGOS	Laboratoire d'Etudes en Géophysique et Océanographie Spatiales
LECZ	Low Elevation Coastal Zone of the south of vietnam

LMDCZ-AFD	Lower Mekong delta coastal zone project -Agence Française pour le Développement
LMI	Laboratoire mixte international
MIO	Institut Méditerranéen d'Océanologie
NGO	Non-governmental
PFIEV	Program de Formation d'Ingénieurs d'Excellence au Vietnam
RESCIF	Réseau d'excellence des sciences de l'ingénieur de la francophonie
RTMs	Reactive transport models
SIWRR	Southern Institute of Water Resources and Research
SPMs	Suspended particulate matters
UGA	Université Grenoble Alpes
UPS	Paul Sabatier University
WARM	WAter Resources and disaster Management
IJL	International Joint Laboratory
ZABR	Zone Atelier Bassin du Rhône

Appendix 1 : CVs of co-directors and of G.Vachaud, co funder of CARE and strategic consultant for LE CARE-IJL

Nicolas Gratiot
Senior researcher
Nicolas.gratiot@ird.fr
www.ird.fr
06/07/74. 43 years old.
Married, 3 children

www.lthe.fr/pageperso/gratiot/

CARE laboratory
B7, 268 Ly Thuong Kiet St, Dist. 10
Ho Chi Minh City, VIETNAM

CURRICULUM VITAE

1. Diplômes

HDR (2010), Université de Grenoble : Impact des sédiments cohésifs sur les écosystèmes.
Doctorat (2000), Université Joseph Fourier : Etude des couches de crèmes de vase turbulentes.

2. 18 ans d'étude de la dynamique sédimentaire, dont 50% en expatriation

2015-… : Centre Asiatique de Recherche sur l'Eau, Vietnam National University (Vietnam).
2007-2009 : Centro de Investigación en Ecosistemas, UNAM (Morelia, Michoacán, Mexique).
2000-2004 : Centre IRD Guyane (UR ELISA; littoraux Amazoniens). Guyane Française.

3. Distinctions

Editor's choice AGU Surface Processes for Gratiot, N., Michallet, H. and Mory, M. 2005, On the determination of the settling flux of cohesive sediments in a turbulent fluid, J. Geophys. Res., 110, C06004.

4. Principaux projets et financements

2016-2017 : UE AFD : Lower Mekong Delta Coastal Zone, 1200k€. PI. P.Marchesiello and San Dinh
2013-2017 : Montage du Centre Asiatique de Rech. sur l'Eau (soutien région Rhône-Alpes, 140k€). PI. N.G.
2012-2016 : ANR JCJC Syst. de caractérisation des agrégats et flocs en rivières chargées, 172k€. PI. N.G.
2011-2013 : EC2CO (Caractérisation des particules en rivière de montagne 2011-2013 30k€, PI. C.Legout).
2007-2012 : European program DESIRE. Desertification Mitigation and Remediation of Land. FP6 : EU Global Change and Ecosystems Programme. PI C.Ritsema. PI Mexique, 200k€ C.Prat.
2007-2010 : ANR Blanc STREAMS, 450k€ (PI. Site Mexique N.G.)
2000-2003 : PNEC, Guyane. Co-animation du thème II « Géomorphologie littorale »

5. Consultance, expertise, review

Editeur associé
Journal of Hydrology (2012-present) ; Open J of Marine Science. (2011-2013); J of Coastal Res (SI, 2013).
Activité de review (pour 25 journaux) Catena, Climate Research, Continental Shelf Research , Earth Surface Processes and Landforms, Ecological Engineering, Environmental Engineering Science, Environmental modeling and software, Estuarine Coast & Shelf Science, GeoMarine Letters, Geophysical Res. Letters, Hydrological processes, HESSDiscussion, HESS, Journal of Coastal Research, Journal of Marine System, Journal of Hydrological Engineering, Journal of Hydrology, Lakes and Reservoirs: research and management, Limnology and Oceanography, Marine Geology, Ocean Dynamics, Remote Sensing, Revista de biologia Tropical, Revue Française de Photogrammétrie et Télédétection, Sécheresse, Scientific reports-Nature.
Participations aux instances de Recherche et de Formation
2013-… : Directeur scientifque du Centre Asiatique de Recherche sur l'Eau
2014-2015 : Resp. par interim de l'équipe RIVER-LTHE (8 permanents)
2014-2015 : Membre élu du Conseil du Laboratoire LTHE
2010-2014 : Membre nommé du bureau de l'Ecole Doctorale « Terre, Univers, Environnement » de l'Univ-Grenoble Alpes et représentant du master TUE-ECE (2012-2015)
2008-2011 : Membre élu de la CSS1 de l'IRD
2009-2010 : Membre du comité d'Evaluation AERES pour l'UMR Lisah (2009) ; UMR LPO (2010)

Expertises :

Pour les provinces d'HoChiMinh ville (eutrophisation), d'U-Minh et Go-Cong (érosion) (Aide de l'Union Européenne) pour l'Europe **EuropeAid**/124705/D/SER/GY, MWH. 2010. Coastal erosion in Guyana.
pour l'ANR JCJC Ed. 2016 ; Vulnérabilité : Milieux et climat 2012
pour le Programme National d'Environnements Côtiers,
pour l'IRD : évaluateur d'un LMI, d'une JEAI, des bourses de thèses et de chaires croisées.

Commissions de recrutements :

Membre nommé du Jury d'admission IRD (2014)-concours des Chargés de Recherche
Bourses doctorales du master TUE (10-14/an, 2010-2014)
Commission d'admissibilité des Chargés de Recherche IRD en CSS1 (2008-2011),
Chaire d'Excellence UJF/IRD (2010),
Concours interne à l'avancement Assistant Ingenieur (2010),
MCF Univ-Grenoble Alpes, (2006), sections 35-36-37 ;
Agent technique, IRD-Guyane (2003)

Jury des M2R Terre Univers Environnement (2006-2014)

9 Jury de soutenance de thèse (6 comme rapporteur) : M. Bernard (2006), F. Ganthy (2011), A.Vongvixay (2012), E. Gensac (2012), S. Chuun (2013), E.Gourdin (2014), R.Walcker (2015), S.Pinet (2017) ; O.Carlier (2018)

2 Jury d'HDR (2 comme rapporteur) JM Martinez (2014) ; J.Deloffre (2016)

7 Comités de thèse G. Antoine (2010-2013), A. Foucher (2012-2014), S.Orseau (2012-2015), I.Jalon-Rojas (2013-2015), C.Jourdain (2014-2016), O.Carlier (2015-2018, UCLouvain, Belgique), S.Pinet(2014-2017).

1 Parrainage scientifique de Raphael ALMAR (2011- ?), CR2 IRD.

Comité d'organisation de colloques internationaux (6) Intercoh'07, Water and Soil Cons. 2011, Int. Coast. Symp. 2013. 4th Regional IWA Membrane Tech. 2014. L'eau en partage, Entretiens J.Cartier 2014, Intl ISEAC5th 2017

6. Production scientifique, brevet (au 16 avril 2017)

42 publications référencées dans le WOS (dont 1 sous presse). h-index de 17

Brevet International Gratiot et al. (PCT, 2015 ; Europe 2016 ; US 2016), instrument SCAF

7. Etudiants thèses

Anh Le Hoang. (2016-2019). Simulating the flow and sediment transport in the lower Mekong basin. co-encadrant S.Soarez, UCLouvain, Belgique.

Tuyet Nguyen. (2015-2018). Risque d'eutrophication dans la rivière Saigon : impact des rejets de la métropole d'Ho-Chi-Minh Ville. co-encadrant J. Némery.

Phuong T.K. Doan. 2014 (38 mois). Caractérisation biogéochimique des barrages tropicaux : cas de la retenue de Cointzio (Michoacán, Mexique). Encadrant principal, co-encadrant J. Némery.

Valentin Wendling. 2015 (40 mois). Characterization of aggregates and flocs in rivers : instrumental development and interactions with hydrodynamics. Encadrant principal, co-encadrant C. Legout.

Anne Sophie Susperregui. 2008 (36 mois). Caractérisation hydro-sédimentaire de la retenue de Cointzio (Michoacán, Mexique). Co-encadrant, directeurs principal : M. Esteves.

Et 12 encadrements de Master 2 ou Projet d'écoles d'ingénieurs.

8. Formation (depuis 2009)

2014- … : Création et coordination scientifique du MOOC collaboratif "Des rivières et des hommes"

2012-2013, Vietnam. Module sédimentaire, master USTH (20h/an).

2010-2012, France. Module Eau et Société, licence 1, Univ. Joseph Fourier (20h/an)

2009, Mexique. Cours et TP : dynamique sédimentaire. Université Nationale Autonome de Mexico. (20h).

2009, France. Travaux pratiques d'hydrométrie et atelier d'ingénierie. 30h. Grenoble-INP

9. Vie collective

2010- 2015: Trésorier puis président de la représentation locale de l'AOS, GRIOS Grenoble.

List of publications Co-publications with southern partners are in grey

In prep./ submitted/ in revision

1. Brunier et al., Mudbank dynamics and impacts on some human rice polder over the last decades. *In revision*.
2. Marchesiello et al., Erosion and sediment transfers along the coastal Mekong delta. To be submitted.

ISI Web of Knowledge all database (updated mai. 2018)

2018-1

Vachaud, G., Quertamp, F., Phan, T.S.H., Tran Ngoc, T.D., Nguyen, T., Luu, X.L., Nguyen, A.T. and Gratiot, N. Flood-related risks in Ho Chi Minh City and ways of mitigation. *submitted* to Journal of Hydrology.

2017-2

Gratiot, N., Bildstein, A., Anh, T.T., Thoss, H., Denis, H., Michallet, H. and Apel, H. 2017. Sediment flocculation in the Mekong River estuary, Vietnam; an important driver of geomorphological changes. Comptes Rendus Geoscience. 349, 260-268.

Camenen, B., Dramais, G., LeCoz, J., Ho, T.D., Gratiot, N. and Piney, S. 2017. Estimation of a water level - discharge rating curve for a river influenced by the tide. La Houille Blanche (5), 16-21.

2016-3

Gratiot, N. and Anthony, E.J. 2016. The contribution of flocculation and settling processes to the sediment dynamics and geological development of the mangrove-colonized, Amazon-influenced mud-bank coast of South America. Marine Geology, 373, 1-10.

Némery, J., Gratiot, N., Doan, T.K.P., Duvert, C., Alvarado-Villanueva, R., Duwig, C. 2016. Carbon, phosphorus, nitrogen and sediment retention in a small tropical reservoir. Aquatic Sciences, 78(1), 171-189. [IF 2.71, Q1]

Wendling, V. Legout, C., Gratiot, N., Grangeon, T. and Michallet, H. 2016. Dynamics of soil aggregates in turbulent flow : respective effect of soil type and suspended concentration. Catena, 141, 66-72.

2015-2

Wendling, V., Gratiot, N., Legout, C., Droppo, I.G., Coulaud, C. and Mercier, B. 2015. Using an optical settling column to assess suspension characteristics within the free, flocculation and hindered settling regimes. J. of Soils and Sediment, (15) 1991-2003. [IF 2.11, Q2]

Doan, T.K.P., Némery, J., Schmid and **Gratiot, N.** 2015. Eutrophication of turbid tropical reservoirs: Modelling for the case of Cointzio, Mexico. Ecological Informatics, (29), 192-205. [IF 1,98, Q2]]

2014-2

Nord, G., Gallart, F., Gratiot, N., Soler, M., Reid, I., Vachtman, D., Latron, J., Martin Vide, J.P., Laronne, J.B. 2014. Applicability of acoustic Doppler devices for flow velocity measurements and discharge estimation in flows with sediment transport. Journal of Hydrology, (509), 504-518.[IF:2.69, Q1]

Anthony, E., Gardel, A. and Gratiot, N. 2014. Fluvial sediment supply, mud banks, cheniers and progradation of the Amazon-influenced, wave-dominated muddy coast of South America. Geol. Soc. Of London.388, 533-560. [NaN]

2013-1

Evrard, O., Poulenard, J., Némery, J., Ayrault, S., Gratiot, N., Duvert, C., Prat, C., Lefevre, I., Bonté, P., Esteves, M. Tracing sediment sources in a tropical highland catchment of central Mexico by using conventional and alternative fingerprinting methods. Hydrological processes, (27), 911-922.[IF 2.70 Q1]

2012-4

Anthony, E.J. and Gratiot, N. 2012. Coastal engineering and large-scale mangrove destruction in Guyana, South America: An environmental catastrophe in the making? Ecological Engineering, (47), 258-273.[IF 3.11, Q2]

Duvert, C., , G. Nord, N. Gratiot, O. Navratil, E. Nadal-Romero, N. Mathys, J. Némery, D. Regüés, F. Gallart, M. Esteves. 2012. Towards prediction of suspended sediment yield from peak discharge in erodible mountainous headwater catchments. Journal of Hydrology, (454-455), 42-55[IF 2.66 Q1]

Grangeon, T., Legout, C., Esteves, M., Gratiot, N., Navratil, O. 2012. Variability of suspended particles size during highly concentrated flood events in a small mountainous catchment. Journal of Soils and Sediments.(12), 1549-1558. [IF 2.57 Q1]

Navratil, O., Evrard, O., Estèves, M., Ayrault, S., Lefèbre, I., Legout, C., Reyss, J-L., Gratiot, N., Némery, J., Mathys, N., Bonté, P., Poirel, A. Core-derived historical records of suspended sediment origin in a mesoscale mountainous catchment: the Bléone River, French Alps. Journal of Soils and Sediments, (12), 1463-1478.[IF 1.97, Q2]

2011-4

Duvert, C., Gratiot, N., Anguiano-Valencia, R., Némery, J., Mendoza, M.E., Carlon-Allende, T., Prat, C., Esteves, M., 2011. Baseflow controls on hydrosedimentary connectivity across scales: insights from a nested catchment study in the mountains of Central Mexico. Catena, 87, 129-140[IF 1.89]

Duvert, C., Gratiot, N., Némery, J., Burgos, A., Navratil, O., 2011. Sub-daily variability of suspended sediment fluxes in small mountainous catchments-Implications for community-based river monitoring. HESS. 15,703-713.

Sottolichio, A., Hurther, D., Gratiot, N., Bretel, P., 2011.. Acoustic turbulence measurements of near-bed suspended sediment dynamics in highly turbid waters of a macrotidal estuary. Continental Shelf Research, 31, S36-S49. (Top 25)

Navratil, O., Esteves, M., Legout, C., Gratiot, N., Willmore, S., Némery, J., Grangeon, T., 2011. Global uncertainty analysis of suspended sediment in monitoring using turbidimeter in a small mountainous river catchment. Journal of Hydrology. 398(3-4), 246-259.

2010-4

Gratiot, N., Duvert, C., Collet, L., Vinson, D., Némery, J., Saenz-Romero, C., 2010. Increase in surface runoff in the central mountains of Mexico: lessons from the past and predictive scenario for the next century. HESS (14) 2, 291-300.

Duvert, C., Gratiot, N., Evrard, O., Navratil, O., Némery, J., Prat, C. and Esteves, M., 2010. Drivers of erosion and suspended sediment transport in three headwater catchments. *Geomorphology 123 (3-4), 243-256.*.

Evrard, O., Némery, J., Gratiot, N., Duvert, C., Ayrault, S., Lefèvre, I., Poulenard, J., Prat, C., Bonté, P. and Esteves, M., 2010. Sediment dynamics during the rainy season in tropical highland catchments of central Mexico using fallout radionuclides. *Geomorphology 124(1-2), 42-54.*

Anthony, E.J., Gardel, A, Gratiot, N., Proisy, C., Allison, M.A., Dolique, F. and Formard, F., 2010. The Amazon-influenced muddy coast of South America: A review of mud bank-shoreline. *Earth Science Review.*103 (3-4), 99-121.

2009-3

Susperregui, A.S., Gratiot, N., Esteves, M. and Prat, C., 2009. A preliminary hydrosedimentary view of a highly turbid, tropical, manmade lake: Cointzio Reservoir (Michoacán, Mexico). Lakes & Reservoirs : Res & Management (14), 31-39.

Proisy, C., Gratiot, N., Anthony, E. J. Gardel, A., Fromard, F., Heuret, P., 2009. Mud bank colonization by opportunistic mangroves: a case study from French Guiana using lidar data. Continental Shelf Research, 29, 632-641.

Kelle,L, Gratiot, N., and Benoît de Thoisy., 2009. Olive ridley turtle Lepidochelys olivacea in French Guiana: back from the brink of regional extirpation?. Oryx, **43** , pp 243-246

2008-2

Gratiot, N., Anthony, E., Gardel, A., Gaucherel, C., Proisy, C. and Wells, J.T.. 2008. Significant contribution of the 18.6 year tidal cycle to regional coastal changes. Nature Geoscience. 1, 169-172.

Anthony, E.J., Dolique, F., Gardel, A., Gratiot, N., Proisy, C. and Polidori, L. 2008.. Nearshore intertidal topography and topographic-forcing mechanisms of an Amazon-derived mud bank in French Guiana. Continental Shelf Research. 28, 813-822.

2007-3

Gratiot, N., Gardel, A. and Anthony, E.J., 2007. Trade-wind waves and mud dynamics on the French Guiana coast, South America: input from ERA-40 wave data and field investigations. Marine Geology. 236, 15-26.

Gratiot, N. and Manning, A.J. , 2007. A Laboratory Study of Dilute Suspension Mud Floc Characteristics in an Oscillatory Diffusive Turbulent Flow, SI 50 (Proceedings of the 9th International Coastal Symposium), 1142 – 1146.

Kelle, L., Gratiot, N., Nobilos, I., Thérèse, J., Wongsopawiro, R., de Thoisy, B. 2007. Monitoring of the nesting leatherback turtle (Dermochelys coriacea): contribution of remote-sensing for real-time assessment of beach coverage in French Guiana. Chelonian conservation and biology. ***(6)1,142-147***.

2006-3

Gratiot, N., Gratiot, J., de Thoisy, B., Kelle, L. 2006. Estimation of marine turtles nesting from incomplete data ; statistical adjustment of a sinusoidal function. Animal Conservation. 9, 95-102.

Fiot, J., and Gratiot, N. 2006. Structural effects of tidal exposures on mudflats along the French Guiana coast (N.E. South America). Experimental and field approaches. Marine Geology. 228, 25-37. (Top 25)

Gardel, A. and Gratiot, N., 2006. Monitoring of coastal dynamics in French Guiana from 16 years of SPOT satellite images,. J.Coastal Res SI (39). 1503-1506.

2005-2

Gratiot, N., Michallet, H. and Mory, M. 2005, On the determination of the settling flux of cohesive sediments in a turbulent fluid, J. Geophys. Res., 110, C06004 (Editor Highlights)

Gardel, A. and Gratiot, N., 2005. A satellite image-based method for estimating rates of mud bank migration, French Guiana, South America. J.Coastal Res, 21(4), 720-728.

2004-3

Gratiot, N. and Manning, A.J 2004. An experimental investigation of floc's characteristics in a diffusive turbulent flow. J.Coastal Res,, SI(41), 105-113

Lefebvre, J.-P., Dolique, F. and **Gratiot, N**. 2004. Geomorphic evolution of a coastal mudflat under oceanic influences: an example from the dynamic shoreline of French Guiana. Marine Geology. 208: 191-205.

Baghdadi, N., Gratiot, N., Oliveros, C., Lefebvre, J.-P., Bourguignon, A. 2004. Coastline and mudbank monitoring in French Guiana Contributions of radar and optical satellite imagery. Canadian J.Remote Sensing. 30 No2, 109-122.

2000-1

Gratiot, N., Mory, M. and Auchère, D., 2000. An acoustic Doppler velocimeter (ADV) for the characterisation of turbulence in concentrated fluid mud. Continental Shelf Research, 20, 1551-1567.

List of chapter books

2018 Toorman, E. et al. Interaction of mangroves, coastal hydrodynamics and morphodynamics along the coastal fringes of Guiane francaise, Suriname and Guyana. Threats to Mangrove Forests: Hazards, Vulnerability, and Management. Book series.

2016 Tran Ngoc, T.D., Perset, M., Strady, E., Phan, T.S.H., Vachaud, G., Quertamp, F. and Gratiot, N. HoChiMinhCity growing with water related challenges. 2016. In book : Water Megacities and Global Change, Ed. UNESCO and Arceau Idf, 46-49 pp.

2016 Jodeau, M., Antoine, G., Cormier, M., Monnoyer, Q. and Gratiot, N., 2016. Settling velocity of sediment from reservoirs, laboratory measurements and modeling. 2016. River flow 2016. Ed Constantinescu, Garcia and Hanes, CRC Press. pp 937-943.

2016 Walcker, R., Gratiot, N., Anthony, E. 2016. Remote sensing-based monitoring of the muddy mangrove coastline of French Guiana, In book: Land Surface Remote Sensing in Urban and Coastal Areas, Ed, Zribi, Baghdadi. Elsevier pp.297-320.

2011 Gardel, A. and Gratiot, N., 2012. L'érosion du littoral : état des connaissances. Guyane Océane. Ed. Guiral IRD & R.Leguen, pp142-147.

2012 Prat Christian, Medina-Orozco L.E., Carlon T., Mendoza M., Etchevers J., Patron E.R., Alcala de Jesus M., Bravo-Espinosa M., Gratiot N., Nemery J. 2011. Estudio multiescala de la erosion de suelos en la cuenca de Cointzio, Michoacan. In : Guerrero Pena A.(ed.), Galmiche Tejeda A. (ed.), Carrillo Avila E. (ed.), Vazquez Hernandez M.C.L. (ed.), Santos Argüelles R.G. (ed.), Fortis Hernandez M. (ed.), Salazar Sosa E. (ed.) Haciendo quimica en Campeche con los suelos de Mexico : libro de resumenes en extenso. San Francisco de Campeche(MEX) ; Mexico : Colegio de Postgraduados en Ciencias Agricolas ; Sociedad Mexicana de la Cienca del Suelo, 2011, p. 696-701. Congreso Nacional de la Ciencia del Suelo : Haciendo Quimica en Campeche con los Suelos de Mexico, 36., Mexico (MEX), 2011/11/21-25.

2008 Gratiot, N. and Manning, A.J., 2008. Chapitre 5. Flocculation processes in concentrated benthic suspension layer (CBS) using a laboratory diffusive turbulent grid tank. In: T. Kudusa, H. Yamanishi, J. Spearman and J.Z. Gailani, (eds.), Sediment and Ecohydraulics - Proc. in Marine Science, INTERCOH 2005, Amsterdam: Elsevier, Volume 9, 2008, pp 53-67.

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Invited conferences

Gratiot, N. 2015. Zoom sur un des outils de formation, les Massive Open Online Courses (MOOCs) : potentialité pour la formation initiale? Atelier de maturation du projet de master à vocation régionale sur les environnements côtiers et marins. Libreville, Gabon, 1-6 juin 2015.

Gratiot, N. 2004. Desenvolvimento Sócio-Econômico e Gestão Ambiental Urbana – A Problemática da Água em Regiões Metropolitanas. Mesa Redonda: Gestão dos Ambientes Naturais Urbanos. Prefeitura do Recife, 5-7 juillet 2004. Recife.

Nguyen Phuoc Dan
Directure
npdan@yahoo.com
September 24th 1963, 55 years old
Married, 3 children

CARE Laboratory
B7, 268 Ly Thuong Kiet St, Dist. 10
Ho Chi Minh City, VIETNAM

1. Personal Information

Diploma of Engineering (1986), Ho Chi Minh City University of technology, Vietnam.
Master of Engineering (1993), Asian Institute of Technology (AIT), Bangkok, Thailand.
Doctor of Engineering (April, 2002), Asian Institute of Technology (AIT), Bangkok, Thailand.

1. Employment Record

May 2007 up to now: Dean of Faculty of Environment and Natural Resources –HCMUT, Ho Chi Minh City University of Technology (HCMUT), Vietnam.
2003 to May 2007: Vice Dean of Faculty of Environment-HCMUT, Ho Chi Minh City University of Technology, Vietnam
April 2002 to August 2003: Lecturer and Researcher, Institute of Environment and Resources (CEFINEA) – National University – HCM City, Vietnam
1999 – 2002: Doctoral student, Studying Doctoral Program in AIT.
1993 – 1999: Lecturer and Researcher, Institute of Environment and Resources (CEFINEA) – National University – HCM City, Vietnam.
1991 – 1993: Master student, Studying Master Program in AIT.
1986 – 1991: Research associate, Ho Chi Minh City University of Technology, Vietnam.

2. Research project

2002: Waste audit for Vinh Loi shrimp processing factory
2002: Municipal upgrading for TanHoa-Logom Basin
2002: Rural water supply and sanitation in flooded area in Mekong Delta
2002: Environmental and Social Review for Private Enterprises
2003: Strengthening Environmental and Social Safeguards Implementation in VN
2003: Effects of non-biodegradable COD to receiving water
2003: Study on odor removal of EM-Bokashi for municipal solid waste
2003: Design on wastewater treatment plant of Binh Dien Market (2500 m^3/day)
2004: Short-training on industrial wastewater controls
2004: Short training on wastewater and solid waste management
2004: Design on dyeing wastewater treatment plant of Joubo Textile company (800 m^3/day)
2004: Design on wastewater treatment plant of Tropical Diseases Hospital (500m^3/day)
2005: Design on wastewater treatment plant of Vinh Loc B Residential area (4000 m^3/day)
2005: Design on solid waste transfer station of District 5 (20tons/day)
2006: Set-up of EIA on Environment and Sanitation Improvement for Nha Trang City Wastewater Treatment Plant in Qui Nhon City
2008: Set-up of EIA on CEPT Wastewater Treatment Plant Project in Qui Nhon City
2008: Rural water supply and sanitation in dong Thap Province
2009: Set-up Environmental Management Plan for sewerage WWTPs of Thu Dau Mot town –Binh Duong
2009: Study on long-term operation of submerge membrane bioreactor for treatment of Caravell Hotel wastewater HCMC
2010: Pilot study on GPS application for management of septage trucks in HCMC

International joint research project

2003: Cleaner Production (CP) in seafood processing industry
2004 - 2005: Status of Ground water management in Ho Chi Minh City
2006: Alternative water resources in HCMC

2005 – 2007: Regional water and carbon cycles in the context of human-environment interaction in the lower Mekong basin, Vietnam

2007: Study on denitrification of leachate with MBR process (AUN SEED- NET)

2006 – 2008: Study on aquaculture pond effluent treatment (HCMUT-JICA)

2008: Pilot study on up flow multi-bed biological reactor for domestic and industrial wastewater in HCMC (UEEM-AIT)

2008: Study on emission of dioxin from incinerating PCB waste oil

2009: Study on appropriate latex processing wastewater treatment (HCMUT-JICA)

2009: Pilot study on up flow multi-bed biological reactor for domestic and industrial wastewater in HCMC (ECODIGM-Korea)

2010: Pilot scale-study on membrane based industrial wastewater reuse application for agriculture in HCMC, Vietnam (AIT)

2010 - 2013: Monitoring mercury compounds of water, biota and sediment of Tien river (GIST)

2010: Study on low carbon society in Asian country (Kyushu University)

2010 – 2014: Study on Sustainable Integration of local agriculture and biomass industries (JICA)

2013 -2014: Vulnerability and adaptation to climate change of Asian Cities-Case study in Vietnam (AIT)

2014 -2015: Trace metals (Cu, Zn, Pb and Cd) in Mollusca, sediment and water at Tien river Estuary-Mekong delta and Sai Gon river basin in Viet Nam (GIST)

2014 – 2015: Study on direct ultrafiltration membrane up-concentration and co-anaerobic digestion for domestic energy recovery from sewage and kitchen waste treatments (VITO)

2015 – 2016: Monitoring trace metals in clams and their habitats at Can Gio coastal area (GIST)

2015 – 2016: Pilot study on mitigation of disinfection by products (DBPs) for Saigon River Treatment Plant (DOST and WASECO)

2016 – 2017: Application of partial nitration coupled with anammox for old municipal old landfill leachate (VNU-HCM)

Note :

ADEME - Agence de l'Environnement et de la Maitrise de l'Energie
AUN/SEED-NET - ASEAN University Network/Southeast Asia Engineering Education Development Network
DOST - Department of Science and Technology
GIST - Kwangju Institute of Science and Technology, Korea
HCMC - Ho Chi Minh City
JICA – Japan International Cooperation Agency
VITO - Lames Installing over Technologist Onderzoek NV (Flemish Institute for Technological Research)
VNU-HCM – Vietnam National University-Ho Chi Minh City
WASECO – Saigon Water Supply Company

3. Education Thesis

Le Thi Minh Tam. Research on EDCs technology in Sai Gon river for clean water supply
Nguyen Thanh Phuong. Study on the improvement of urban solid waste decomposition rate in burial conditions
Nguyen Thi My Hien. Study on elemental balance (C, N, P) in recycle and reuse cycle
Phan The Nhat. Study on the application of partial nitrification process - anammox and snap to treat old leachate
Truong Thanh Quang Dung. Study on the development of industrial waste management and use solutions in Ho Chi Minh City
Dang Vu Xuan Huyen. Evaluate the re-use of waste water after treatment of rubber latex and livestock processing industry for irrigation and safe regulation.

List of Publication

C. Polprasert, **N.P. Dan, N**. Thayalakumaran (1996). Application of constructed wetlands to treat some toxic wastewaters under tropical conditions. *Water Science and Technology*, *Volume 34, Issue 11*, *1996*, *Pages 165-171.* **IF: 1.197, SCIE**).

Dan N.P., Visvanathan C., C. Polprasert and Ben Aim R. (2001). High Salinity wastewater treatment using yeast and bacterial membrane bioreactors. *Water Science and Technology, Vol.46 No.9, pp.201-209.* (SCI) **IF: 1.197, SCIE**).

Dan N.P, Visvanathan C. and Biswadeep B. (2003). Comparative Evaluation of Yeast and Mixed Bacterial Treatment of High Salinity Wastewater Based on Biokinetic Coefficients. *Bioresource Technology, Vol 87, pp.51-56*. (ISSN: 0960-8524 (SCI) **IF: 5.651, SCI**).

T. D. Thang, **N.P. Dan** and C. Visvanathan (2002). Impact of Saltwater Instrusion onVietnamese Rural Coastal Communities. *Asian Water Journal. ,Vol.4,No.6. August 2002, ngoai ISI.*

Dan, N.P., Thanh B.X. and Truong, B.D. (2006). Case Studies of Groundwater Pollution in Southeast Vietnam. *International Review for Environmental Strategies. Vol.18. No.6, pp.361-372.* ISSN: 1345-7594 (IGES Publication, Japan), *ngoai ISI.*

N.P.Dan, C.Visvanathan, R.Ben Aim and V.Jegatheesan (2006). Comparative Study On Performance Of Yeast And Bacterial Membrane Bioreactors For High Salinity Wastewater Treatment. *Int. Journal Environmental Technology and Management, Vol. 6, No. 6,pp. 612-630 2006.* Indesscience Publishers. ISSN:1466-2132 (RG Journal Impact = 0.33), *ngoai ISI.*

Dan, N.P. and Viet, N.T. (2009). Status and strategies on solid waste management in Ho Chi Minh City. *International Journal of Environment and Waste and Management* (IJEWM), *Vol. 4, Nos. ¾, pp.412-421, 2009.*

N. P. Dan, L.V. Khoa, B. X. Thanh, P. T. Nga and C. Visvanathan (2011). Potential of Wastewater Reclamation to Reduce Fresh Water Stress in Ho Chi Minh City-Vietnam. *Journal of Water Sustainability,* p.p. 21-29, Vol. 1, Issue 3, Dec 2011. ISSN: 1839-1516

Bui Xuan Thanh, Vo Thi Kim Quyen, **Nguyen Phuoc Dan** (2011). Removal of non-biodegradable organic matters from membrane bioreactor permeate by oxidation processes. *Journal of Water Sustainability,* p.p. 31-41, Vol. 1, Issue 3, Dec 2011. ISSN: 1839-1516

Cao Duc Hung, Nguyen Ngoc Han, **Nguyen Phuoc Dan**, Bui Xuan Thanh, Kwon J.C., Shin H.S. and Kim B.W. (2012). Application of upflow multi-layer bioreactor (UMBR) for domestic wastewater treatment in HCMC. *Journal of Membrane Water Treatment*. Vol. 3, No. 2 (2012) 77-88. (SCIE, IF: 0.625; ISSN: 2005-8624)

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Le N., Thanh B.X., **Dan N.P.** (2012). Study of swim-bed technology for COD removal and nitrification for latex wastewater treatment, *International Journal of Global Environmental issue, pp.190-202. Vol.12, Nos 2/3/4, 2012*. (Scopus, ISSN: 1741-5136)

V.N.Trang, L.D. Phuong, **N.P. Dan**, B.X.Thanh and C.Visvanathan (2012). Assessment on the trihalomethanes formation potential of Tan Hiep Water Treatment Plant. *Journal of Water Sustainability*, p.p. 43-53, Vol. 2, Issue 1, Mar 2012. ISSN: 1839-1516

The-Nhat Phan, **Phuoc-Dan Nguyen**, Xuan-Thanh Bui, Daisuke HIRA, Kenji FURUKAWA (2012). Study on the Application of Anammox Process Using Polyester Non-woven Biomass Carrier Reactor (PNBCR) for Latex Processing Wastewater Treatment. *Journal of Water and Environment Technology*, pp.217-227, Vol. 10, No.2, 2012: ISSN: 1348-2165

Bui Xuan Thanh, **Nguyen Phuoc Dan**, Nguyen Thanh Binh (2012). Fouling mitigation in a submerged membrane bioreactor treating dyeing and textile wastewater. *Desalination and Water Treatment. 47 (2012)150-156.* ISSN: 0011-9164 ***(SCIE) IF = 0.752***

Thanh, B.X., Hien, V.T.D., **Dan, N.P.**, Van, P.T.H., Tin, N.T. (2012). Performance of wetland roof treating domestic wastewater in the tropic urban area, *Journal of Water Sustainability,* p.p. 79-86, Vol. 2, Issue 1, Mar 2012. ISSN: 1839-1516

Luc, N.T., Nam, T.T. **Dan N.P**, Thanh B.X. (2012). Aerobic granulation in Sequencing Batch Airlift Reactor for Organic and Nitrogen removal. *Thai Environmental Engineering Journal.* Special Vol. January-April 2012: 7-11. ISSN: 1686-2961 ***IF: 0.014***

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Thy, L.L., Thanh, B.X., **Dan, N.P**., Visvanathan, C. (2013). Evaluation performance of Airlift Membrane Bioreactor treating wastewater from industrial park in Ho Chi Minh City, *Asean Engineering Journal- Part C, 2(1), 94-113. (ISSN: 2286-8150)*

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Vu Nha Trang, **Nguyen Phuoc Dan**, Lai Duy Phuong, Bui Xuan Thanh (2014). Pilot study on the removal of TOC, THMs and HAAs in drinking water using ozone/UV – BAC. *Desalination and Water Treatment (DWT) Vol.52, Issue 4-6, 2014* ISSN: 1944-3994 **(SCIE) IF = 0.752**.

Phan Thi Hai Van, nguyen Thanh Tin, Vo Thi Dieu Hien, Thai Minh Quan, Bui Xuan Thanh, Vo Thanh Hang, Dinh Quoc Tuc, **Nguyen Phuoc Dan**, Le Van Khoa, Vo Le Phu, Nguyen Thanh Son, Nguyen Duc Luong, Eugene Kwon, jingyong Jung, Injae Yoon and Sijin Lee (2014). Nutrient removal by different plants in wetland roof systems treating domestic wastewater. *Desalination and Water Treatment. (2014)1-9.www.deswater.com.* **IF = 0.752, SCIE**

Y Hong, **NP Dan**, E Kim, H-J Choi, S Han (2014). Application of diffusive gel-type probes for assessing redox zonation and mercury methylation in Mekong Delta sediment. *Environmental Science: Processes & Impacts, 16(7), p.799-808*. **IF: 2.085, SCI,** ISSN 2050-7887

T.A.H. Nguyen, H.H. Ngo, W.S. Guo, J. Zhang, S. Liang, D.J. Lee, **P.D. Nguyen,** X.T. Bui (2014). Modification of agricultural waste/by-products for enhanced phosphate removal and recovery: Potential and obstacles. *Bioresource Technology, V.169, p.750-762.* ISSN: 0960-8524 (SCI), **IF: 4.980**.

Phan The Nhat, Ha Nhu Biec, **Nguyen Phuoc Dan** and Bui Xuan Thanh (2014). Apllication of Partial nitritation and Anamox system the old landfill leachate treatment. *International Biodeterioradation and Biodegradation*.. **IF: 2.962** (SCI).

Phuong Tram Vo, Huu Hao Ngo, Wenshan Guo, John L.Zhou, **Phuoc Dan Nguyen,** Andrzej Listowski, Xiaochang C.Wang (2014). A mini-review on the impacts of climate change on wastewater reclamation and reuse. *Science of the Total Environment. Vol 494-495, p 9-17.* **IF: 3.163**. SCIE

T.A.H. Nguyen, H.H. Ngo, W.S. Guo, J. Zhang, S. Liang, D.J. Lee, **P.D. Nguyen**, X.T. Bui (2014). Modification of agricultural waste/by-products for enhanced phosphate removal and recovery: Potential and obstacles. *Bioresource Technology* 169 (2014) 750–762. **IF: 4.980, SCI**Thanh B.X., Thy L.L., **Dan N.P.**, Visvanathan C. (2014). Industrial wastewater reuse by airlift external membrane bioreactor. *Sustainable Environment Research*, 24(1), 41-47. (Scopus, ISSN: 1022-7630).

Thanh B.X., Tin N.T., Van P.T.H., Hien V.T.D., **Dan N.P.,** Koottatep T. (2014). Performance of wetland roof with Melampodium paludosum treating septic tank effluent, *Desalination and Water Treatment*, 52(4-6), 1070-1076 (SCIE, **IF = 1.173;** ISSN: 1944-3994).

Fumiko Oritate, Y. Yuyama, M.Nakamura, M. Yamaoka, **Phuoc Dan Nguyen**, D.V.B.Hanh, K.Mochidzuki and A. Sakoda (2015). Regional Diagnosis of Biomass Use in Suburban Village in Southern Vietnam. *Journal of the Japan Institute of Energy.* 94. 80-5-829.

Cornelis J van Leeuwen, **Nguyen P Dan** and Carel Dieperinkz (2016). The Challenges of Water Governance in Ho Chi Minh City. *Integrated Environmental Assessment and Management*, Volume 12, Issue 2, April 2016, Pages: 345–352.1664.

Shila Maskeya, Hoseung Chaea, Kwangyul Leea, **Nguyen Phuoc Dan**, Tran Tien Khoi, Kihong Park (2016). Morphological and elemental properties of urban aerosols among PM events and different traffic systems. *Journal of Hazardous Materials*, 317 (2016) 108–118, **IF=4.53, SCI.**

Le Thi Minh Tam, **Nguyen Phuoc Dan**, Dinh Quoc Tuc, Huu Hao Ngo, Do Hong Lan Chi (2016). Presence of e-EDCs in surface water and effluents of pollution sources in Sai Gon and Dong Nai river basin, *Sustainable Environment Research*, Volume 26, Issue 1, 20–27. (Scopus, ISSN: 1022-7630)

Thanh-Tin Nguyen, Xuan-Thanh Bui, Thi-Dieu-Hien Vo, Duy-Dat Nguyen, **Phuoc-Dan Nguyen**, Hong-Lan-Chi Do, Huu-Hao Ngo, Wenshan Guo (2016). Performance and membrane fouling of two types of laboratory-scale submerged membrane bioreactors for hospital wastewater treatment at low flux condition. *Separation and Purification Technology* 165 (2016) 123–129. **IF = 3.78, SCIE, ISSN: 1383-5866**

Nguyen Thi Tuyet, **Nguyen Phuoc Dan,** Nguyen Cong Vu, Nguyen Le Hoang Trung, Bui Xuan Thanh, Heleen De Wever, Marcel Goemans and Ludo Diels (2016). Laboratory-scale membrane up-concentration and co-anaerobic digestion for energy recovery from sewage and kitchen waste. *Water Science and Technology*, 73 (3) 597-606; DOI: 10.2166/wst.2015.535. **IF = 1.106, SCIE**

Vo Thi Dieu Hien, Nguyen Thanh Tin, Le Hong Ngoc, Bui Xuan Thanh, Dinh Quoc Tuc, **Nguyen Phuoc Dan** (2016). Investigation of Trihalomethanes Contamination in Surface Water Treatment Plants and Water Supply Network in An Giang-Mekong Delta Province of Viet Nam. *Journal of Water Sustainability*, Volume 5, Issue 3, September 2015, 85-94. ISSN=1839-1524/1839-1516.

Fumiko Oritate, Masato Nakamura, **Dan Phuoc Nguyen**, Hanh Vu Bich Dang, Khanh Duy Nguyen, Yoshito Yuya (2016). Feasibility for use of digested slurry by the pouring method in paddy fields of Southern Vietnam, *Paddy and Water Environment*, Volume 14, Issue 4, Springer Japan. 429–438, 2016. **IF = 0.916, ISSN 1611-2490**

Strady E, Vu Bich Hanh Dang, Némery J,Guédron S, Quoc Tuc Dinh, Denis H, **Phuoc Dan Nguyen** (2017) Baseline seasonal investigation of nutrients and trace metals in surface waters and sediments along the Saigon River basin impacted by the megacity of Ho Chi Minh City (Vietnam), *Environmental Science and Pollution Research*, 24, 3226 -3243, 2017, **IF=2.76, SCI, ISSN 0944-1344**

Tin N.T., Thanh B.X., **Dan N.P**., Guo W., Ngo H.H. (2017). Removal of antibiotics in sponge membrane bioreactors treating hospital wastewater: Comparison between hollow fiber and flat sheet membrane systems, *Bioresource Technology*, https://doi.org/10.1016/j.biortech.2017.02.118. **IF: 4.980, SCI**

Chen C., Guo W., Ngo H.H., Chang S.W., Nguyen, D.D., **Nguyen, P.D**., Thanh B.X., Wu, Y. (2017). Impact of reactor configurations on the performance of a granular anaerobic membrane bioreactor for municipal wastewater treatment, *International Biodeterioration & Biodegradation*, 121, 131-138 (SCIE, **IF = 2.593**, ISSN: 0964-8305).

Strady E, Dinh QT, Némery J, Nguyen TN,Guédron S, Nguyen SN, Denis H, **Nguyen PD** (2017). Spatial variation and risk assessment of trace metals in water and sediment of the Mekong Delta, *Chemosphere,* 179, 367-378 (**IF=4.208**), SCIE.

Nhat P.T., Van T.T.T., Biec H.N., **Dan N.P**.,Thanh B.X., Trong D.B., Tuan D.V., Park J.,Guo W. Hao N (2017). High rate nitrogen removal by ANAMMOX internalcirculation reactor (IC) for old landfill leachate treatment, *Bioresource Technology*, Volume 234, 281–288. **IF: 4.980, SCI**

Phan The Nhat, Ha Nhu Biec, Truong Thi Thanh Van, Doan Van Tuan, Nguyen Le Hoang Trung, Vo Thuy Khanh Nghi, **Nguyen Phuoc Dan** (2017). Stability of partial nitritation in a sequencing batch reactor fed with high ammonium strength old urban landfill leachate. *International Biodeterioration & Biodegradation*. (SCIE, **IF = 2.593**, ISSN: 0964-8305)

Nguyen Nhu Hien, Doan Van Tuan, Vo nguyen Xuan Que, Truong Thi Thanh Van, Phan The Nhat, Nguyen Van Tam, **Nguyen Phuoc Dan** (2017). Application of oxygen limited autotrophic nitritation/denitrification (OLAND) for anaerobic latex processing wastewater treatment. *International Biodeterioration & Biodegradation (*in press). (SCIE, **IF = 2.593**, ISSN: 0964-8305)

Masato Nakamura, Fumiko Oritate, Yoshito Yuyama, Masaru Yamaoka, **Nguyen Phuoc Dan**, Dang Vu Bich Hanh (2017). Ammonia volatilization from Vietnamese acid sulfate paddy soil following application of digested slurry from biogas digester. *Paddy Water Environ.* Springer Japan KK 2017. DOI 10.1007/s10333-017-0616-9. **IF = 0.916**.

S.S. Ray,S.S. Chen, N.C. Nguyen, H.T. Nguyen, **N.P. Dan** ,B.X. Thanh, L.T. Trang. (2018). Exploration of polyelectrolyte incorporated with Triton-X 114 surfactant based osmotic agent for forward osmosis desalination. *Journal of Environmental Management* (2018)

List of Chapter books

1. Example of Design on Industrial and domestic wastewater treatment (2003). HCMC National University Publisher (in Vietnamese).
2. Example of Design on surface water treatment plant (2009). HCMC National University publisher (in Vietnamese).
3. **Dan, N.P.,** Thanh, B.X., Khoa, L.V., Truong, B.D. (2006). Case study: Groundwater resources management in HCMC, Book chapter in Sustainable groundwater management in asian cities - *A summary report of Research on Sustainable Water Management in Asia*, Fresh Water Resources Management Project, IGES, Japan. ISBN 4-88788-029-4.
4. Dan, N.P., Ha, N.T.V., **Thanh, B.X**., Khoa, L.V. (2007). Chapter 3: Water resources management in Ho Chi Minh City, Sustainable Groundwater Management in Asian Cities. International Global Environmental Strategy (IGES) Hayama, Japan, IGES, pp. 68-92. ISBN: 4-88788-039-9.

Dr. Georges Vachaud has contributed greatly to the setting up of the CARE research center. Within CARE-IJL, he will continue his essential role as scientific and strategic consultant.

Georges **VACHAUD**
Emeritus Senior Scientist CNRS
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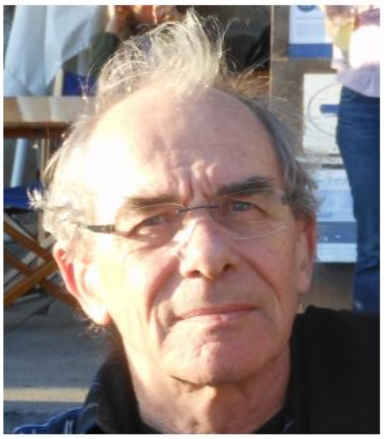
Doctor Honoris Causa, Vietnam Nat. Univ, (2014)
Grand Prize, French Académy of Sciences (2012)
Knight of **French National Order of Merit** (2004)
Medal of Science, RS Vietnam (2005)
Darcy Medal, European Geophysical Soc., (2003)
Elected Member, **Academia Europaea** (1998)
Fellow, Am.Soc. Agron., Am. Soc. Soil Sci. (1994)
Silver Medal, French Nat. Res. Council-CNRS (1977)



PRESENT POSITION

Whole career, from 1964 to 2004 with the French National Research Council (CNRS) to finish at the highest grade (Classe Exceptionelle 2). Still in activity with the grade of Emeritus.

PREVIOUS PROFESSIONAL EXPERIENCE

Was the founder in 1968 within the "Institute of Fluid Mechanics", Grenoble of a research group on water resources and hydrology, which has became the « Laboratoire des Transferts en Hydrologie et Environnement, LTHE » a major institution in Europe on water resources and hydrology, with 80 full time researchers, now merged within **Institut des Geosciences et de l'Environnement** (www.ige-grenoble.fr),
Was in charge of evaluation of French research units and programs in the field of continental surfaces (soil, water) for the French National Research Council
(CNRS) from 1998 to 2008. Is acting as regular evaluator of EU funded programmes since 1995, including Horizon 2020
Was in charge of the French Vietnamese Program on Water, between VAST and CNRS, from 2002 to 2008, and of the settings of the Asian Research Center for Water , CARE (carerescif.hcmut.edu.vn/en/), HoChiMinh City in 2012

RESEARCH INTERESTS AND INVOLMENTS

1-water and contaminant transport from the soil surface to the groundwater through the unsaturated zone of the soil, particularly in agriculture
2- from1998 to 2014 surface and groudwater water pollution and contamination of water ecosystems, integrated water resources management
3- since 2014, impact of climate change on water cycle

INTERNATIONAL AND NATIONAL RESPONSABILITIES

Expert with **FAO/IAEA** Div. on use of isotopes in agriculture, 1980-1996
Member, **Academia Europaea** since 1998
Vice President, **International Union Soil Sci.** (Soils Physics), 1990-1994
President of **European Geophysical Society**, (now **EGU**) , 1992-1996
Associated Editor, **Water resources Research**, AGU, 1990-1994
Editor in Chief, **J. of Hydrology**, (1995-2008)
President of the Scientific Committee of the **French Geological Survey (**1998 to 2004)

MOST RELEVANT PUBLICATIONS

Co-author of more than 90 scientific papers, with h-index 32, and was main advisor for 45 thesis.

Appendix 2 : Scientists involved in the LE CARE-IJL (2019-2023)

Brief summary 2015/2018 : Annual support from Vietnam National University and Ho Chi Minh Univ. of Technology (5 ETP/year) and the IGE laboratory (2.25 ETP/ year, excluding PRPT). Punctual support of two UMRs (LEGOS and G-Eau, 26 and 1.25 men.months, respectively).

Summary of the Manpower 2019-2023

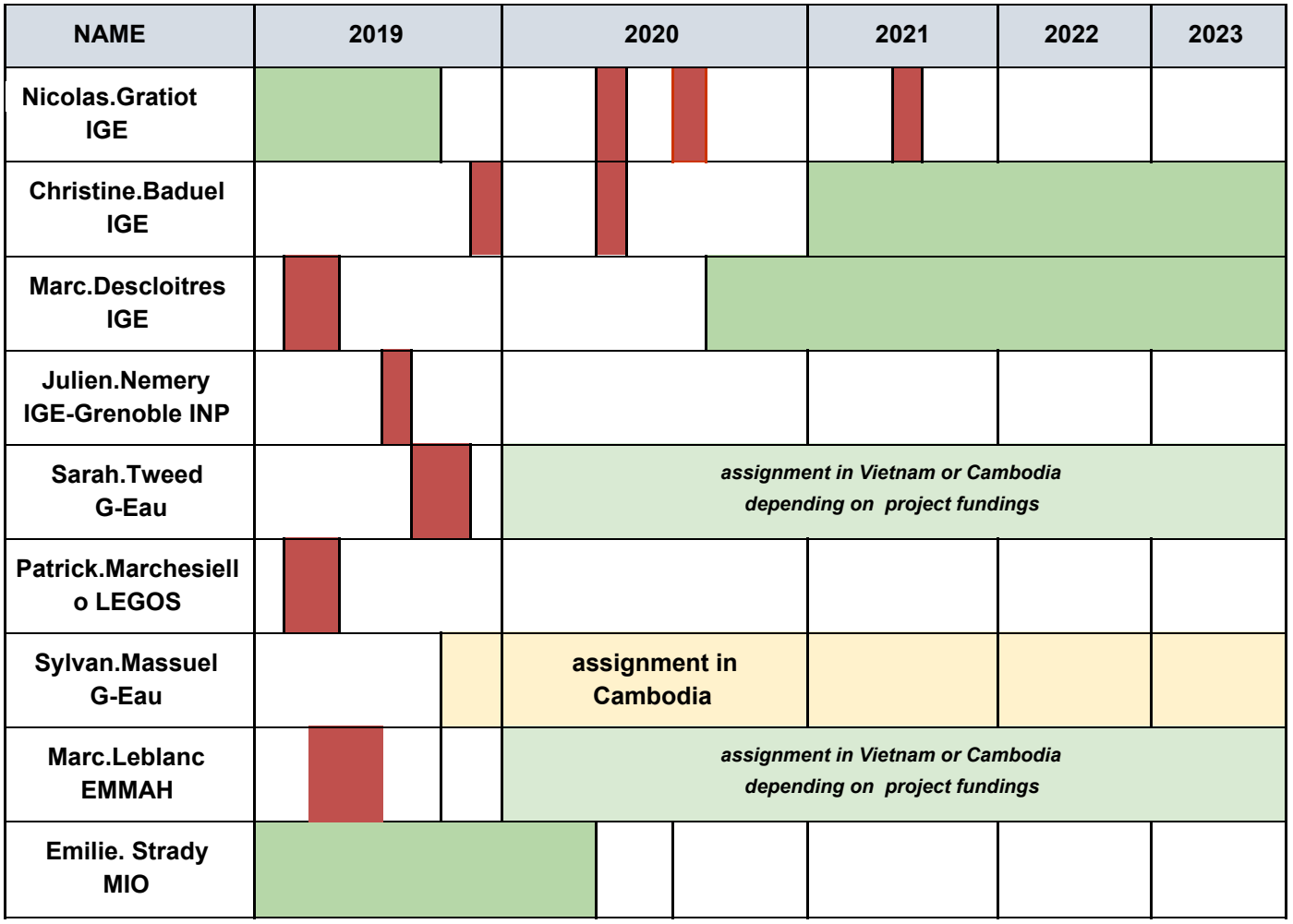
CARE-IJL Manpower	ETP in %	Issue 1 fluxes	Issue 2 contaminants	Issue 3 Water resources	Issue 4 Vulnerability of water resources	Issue 5 Water and green technologies
French	525	105	95	165	150	10
Vietnamese	670	95	210	165	135	75
PhD (VN)	180	100	50	30	0	0
Total VN	850	195	260	195	135	75
TOTAL	1375	300	355	360	285	85

NAME	First Name	Position	Rattachement	Implication	Adresse email	ETP	by Issues				
FRANCE							1	2	3	4	5
GRATIOT	Nicolas	DR Emerite	IRD/IGE	governance/ sediment dynamics	nicolas.gratiot@ird.fr	80	40		30	10	
BADUEL	Christine	CR	IRD/IGE	organic contaminants	christine.baduel@ird.fr	70	10	50		10	
DESCLOITRES	Marc	IR	IRD/IGE	hydro-geophysics	marc.descloitres@ird.fr	70			20	50	
NEMERY	Julien	MdC	INP/IGE	biogeochemistry	julien.nemery@gmail.com	40	30	10			
VACHAUD	Georges	DR Emerite	CNRS/IGE	governance/scientific advisor	georgesvachaud5@gmail.com	30	10		10	10	
TWEED	Sarah	CR	IRD/G-Eau	water fingerprinting	sarah.tweed@ird.fr	30	10			20	
MARCHESIELLO	Patrick	DR Emerite	IRD/LEGOS	ocean atmo phys.	Patrick.Marchesiello@ird.fr	25			25		
MASSUEL	Sylvain	CR	IRD/G-Eau	underground water	sylvain.massuel@ird.fr	25				25	
LEBLANC	Marc	Prof.	EMMAH/Univ Avignon	water resources	marc.leblanc@univ-avignon.fr	25				25	
STRADY	Emilie	CR	IRD/IGE/MIO	biogeochemistry	emilie.strady@ird.fr	20	5	15			
LEFEVRE	Laurent	Prof.	INP/LCIS	applied mathematics	laurent.lefevre@lcis.grenoble-inp.fr	15			15		
RUIN	Isabelle	CR CNRS	IRD/IGE	social sciences	isabelle.ruin@univ-grenoble-alpes.fr	15			15		
ALMAR	Rafael	CR	IRD/LEGOS	ocean atmo phys.	rachid.benshila@legos.obs-mip.fr	15			15		
BENSHILLA	Rachid	IR	IRD/LEGOS	ocean atmo phys.	rachid.benshila@legos.obs-mip.fr	10			10		
SPADINI	Lorenzo	MdC	UGA/IGE	biogeochemistry	lorenzo.spadini@univ-grenoble-alpes.fr	10		10			
MARTINS	Jean	DR CNRS	CNRS/IGE	bacteria	jean.martins@univ-grenoble-alpes.fr	10		10			
LEGTCHENKO	Anatoly	DR IRD	IRD/IGE	hydro-geophysics	anatoly.legtchenko@ird.fr	10			10		
BARTHELEMY	Eric	Prof.	INP/LEGI	sediment dynamics	eric.barthelemy@grenoble-inp.fr	5			5		
SECHET	Philippe	MdC	INP/LEGI	water treatment	philippe.sechet@legi.grenoble-inp.fr	10					10
ANTHONY	Edward	Prof.	CEREGE/Univ Aix	geomorphology	anthony@cerege.fr	10			10		
						525	105	95	165	150	10
VIETNAM											
NGUYEN	Phuoc Dan	directeur	HCMUT/FENR	Environment	npdan@hcmut.edu.vn	80		80			
LE	thi Minh Tar	thèse with NI	HCMUT/FENR	biogeochemistry	minhtammt2006@gmail.com	100		100			
TRAN NGOC	Tien Dung	researcher	HCMUT/CARE	Hydrogeology	tdung.tranngoc@yahoo.ca	60			15	45	
DAO	Thanh Son	Assoc. Prof	HCMUT/FENR	fluid dynamics	dao.son@hcmut.edu.vn	50	40	10			
NGUYEN	thi Ngoc Tu	thèse with Gr	HCMUT/FChe	Nutrient fluxes	ngoctuyet1412@gmail.com	50	50				
PHAN	thi Hai Van	thèse with Cl	HCMUT/FENR	Arsenic	phanhaivan@gmail.com	50					50
TRAN	Hai Yen	thèse with E.	HCMUT/FCE	Dyn sedim	tranhaiyen3103@gmail.com	50			50		
BUI	Xuan Thanh	Assoc. Prof	HCMUT/FENR	Environment	bxthanh@hcmut.edu.vn	40		20			20
NGUYEN	Thong	Head of Wate	HCMUT/FCE	Fluid Dynamics	nthong56@yahoo.fr	40			40		
NGO	Tan Phong	lecturer	HCMUT/GeoPet	hydrogeology	ngotanphong@hcmut.edu.vn	40				40	
HO	Tuan Duc	ass prof	HCMUT/FCE	Fluid Dynamics	hotuanduc@hcmut.edu.vn	30			40		
TRAN	Anh Tu		HCMUT/GeoPet	geology sedimentology	trantu@hcmut.edu.vn	30				30	
LUU	Xuan Loc		HCMUT/FCE	Fluid Dynamics	loc_ecd@yahoo.com	10			10		
VO	Le Phu		HCMUT/FENR	arsenic	phulevo@gmail.com	10	5				5
DINH	Quoc Tuc		PolyMtl	Environmental & Health	quoctuc@yahoo.com	10				10	
NGO	thi Thu Tran		Univ Soc Science	risk and hazard perceptions	ngothutrang1980@gmail.com	10			10		
NGUYEN	Lai	thèse with L I	HCMUT/Computing	supervised command	Le-Duy-Lai.Nguyen@lcis.grenoble-inp.fr	10				10	
						670	95	210	165	135	75
PhD											
HOANG	Anh	thèse N.Grati	UCL	sediment dyanmics (2016-2020)	anh.le@uclouvain.be	30			30		
NGUYEN	Truong An	thesis J.Ném	Grenoble-INP (under fi	biogeochemistry (2018-2021)	truongan9393@yahoo.com	100	100				
Le NGUYEN Thier	Tien Kim	thèse S.Dorn	PolyMtl/HCMUT	biogeochemistry (2017-2021)	thienkimbk09@gmail.com	50		50			
X	X	thesis Descl		hydrogeophysics (2020-2023)	under planification						
Y	Y	thesis Badue		emerging contaminant (2020-202	under planification						
						180	100	50	30	0	0

Associate partners from RESCIF network					
DE ALENCASTRO	Luiz Felippe	MER	EPFL	environment & health	felippe.dealencastro@e
ROSSI	Pierre	Prof.	EPFL	environe & health	pierre.rossi@epfl.ch
BERNIER LATMANI	Rizlan	Prof.	EPFL	micro biology	rizlan.bernier-latmani@
SCHÖNENBERG	Klaus	DR	EPFL	water and health	klaus.schonenberger@
DORNER	Sarah	Professeure	EPolytechnique Montre	biogeochemistry	sarah.dorner@polymtl.c
DUBE	Line	Dir. RI EPM 10	EPolytechnique Montre	internation relationship	line.dube@polymtl.ca
SOAREZ	Sandra	Professeure	Louvain	MOOCs and sediment	Sandra.Soares-Frazao(
ZECH	Yves		Louvain	MOOCs	
AUTRES PARTENAIRES IRD associés					
HERRMANN	Marine	CR IRD	LMI LOTUS	Modèle oceano bio	marine.herrmann@lego
LOISEL	Hubert	Prof	LMI LOTUS	remote sensing	Hubert.Loisel@univ-littc
OUILLON	Sylvain	DR IRD	LMI LOTUS	sediment dynamics	sylvain.ouillon@ird.fr
RIBOLZI	Olivier	DR IRD	LMI LUSES	hydrology	olivier.ribolzi@ird.fr
MARTINEZ	Jean-Michel		IRD GET	remote sensing	jean-michel.martinez@i
Visiting Partners (came at least once in CARE, share data and/or projects and/or published with us ; non exhaustiv list)					
VERPOORTER	Charles	MCf LOG	LMI LOTUS	Teledetection	charles.verpoorter@uni
AIRES	Filipe	Prof			filipe.aires@obspm.fr
LAGREE	Stephane		WANASEA		fsp2s@yahoo.fr
JOSSELIN	Didier	Prof			didier.josselin@univ-avi
DESMET	Marc	Prof	Univ Tours	Sedimento	marc.desmet@univ-tou
BABUT	Marc	Ing	IRSTEA	Sedimento EcoTox	marc.babut@irstea.fr
MOURIER	Brice	CR ENTPE	ENTPE	Sedimento	Brice.MOURIER@entpe
CAMENEN	Benoit	CR IRSTEA	Irstea	Hydrométrie	benoit.camenen@irstea
DRAMAIS	Guillaume	PhD IRSTEA	Irstea	Hydrométrie	guillaume.dramais@irst
GUILLEMOT	Francois	CR	IAO	Histoire Vietnam	francois.guillemot@ens
GEORGES	Didier	Prof	INP	G2ELab	didier.georges@gipsa-la
BIANCAMARIA	Sylvain	CR IRD	IRD LEGOS		sylvain.biancamaria@leg
BIELDERS	Charles		UCL		Charles.Bielders@uclou
GARNIER	Josette	Prof	UMR METIS	Hydrology Biogeochem	josette.garnier@upmc.f
Private companies/NGO/Embassy (MOU agreement and/or sponsorship with CARE)					
BONNET	Matthieu	directeur regional	ARTELIA		Matthieu.BONNET@art
MENTRE	Jerôme	directeur regional	Compagnie Nationale d		J.MENTRE@cnr.tm.fr
NGUYEN	Minh	directeur regional	VINCI		minh.nguyenkhuong@v
VOAN	Tuan	directeur regional	VUCICO		voanhtuanus@yahoo.c
MOLAY	Eric	attaché de cooperation	Ambassade/Consulat d		eric.molay@institutfranc
JOLY	Romain	chef de projet	NGO 1001 Fontaines		romain.joly@1001fontai

Table sheet from https://docs.google.com/spreadsheets/d/14eAJsE4i3oZ9fBdOjRT5HhhFhk8mne1woXoMiVMRooc/edit#gid=169634530

Appendix 3: Time schedule of expected assignment in Vietnam



Note:

	Desired period to be assigned in CARE lab
	Desired MLD (minimum 2 months) as visiting scientist

Vietnamese Partners : Anticipated MLD request (South North)

For 2018 we obtained two : Tran Ngoc Dung with I.Ruin (IGE-Grenoble) ; Nguyen Thong with P. Marchesiello (LEGOS-Toulouse)

8 candidates over the 2019-2022 period :

IGE-Grenoble : Son Dao and Tuyet Nguyen to work with J.Némery and N.Gratiot ; Tran Ngoc Dung to work with Isabelle Ruin ; Phong Ngo Tan to wok with M.Descloitres

LEGOS-Toulouse : Nguyen Thong and Hai Yen Tran to work with P. Marchesiello

MIO-Marseille : Kieu Le Thuy Chung to work with Emilie Strady

Other opportunities : ISTERRE : Hai Van Phan to work with a colleague of UMR (L.Charlet or another one)

Appendix 4 Universités et Écoles Doctorales (filières et responsables) impliquées

Grenoble : PFIEV Grenoble INP / ENSE3 (Eau Energie Environnement
Ecole Doctorale Terre Univers Environnement (ed-tue.osug.fr)
Ecole doctorale IMEP 2 (Mécanique) http://www.adum.fr/as/ed/
Vietnam : FENR, FCE
Belgique : UCLouvain/ Ecole polytechnique de Louvain uclouvain.be/fr/facultes/epl
Canada : Polyt Montreal/ doctoral school name
Suisse : Ecole polytechnique fédérale de Lausanne

Appendix 5 : List of equipment and technical means

Quantity	Equipments		
IRD Grenoble INP		cost k€	whos in charge
1	multiparameter probe HYDROLAB DS5 + cable: T, pressure, pH, O2, Conductivity, redox, Chl-a, Turbidity	14	NG
1	multiparameter probe WtW (pH, O2, conductivity)	0.2	ES
1	depth profiler	0.2	ES
1	GPS Garmin	0.2	JN
1	2L Niskin bottle + messenger	0.8	ES
2	vacuum pump	0.8	ES
1	manual vacuum pump	0.1	ES
5	filtration unit	1	ES
1	1-5ml pipette Eppendorf	0.3	ES
1	0.1-1 ml pipette Eppendorf	0.3	ES
1	10 - 100 µl pipette Eppendorf	0.3	ES
1	1-10 µl pipette Eppendorf	0.3	ES
1	agate mortar	0.2	ES
1	weighing scale precizion 0.0001g	1	ES
2	SCAF alpha (système de caractérisation des agrégats et des flocs)	10	NG
1	LISST (particle sizer)	27	NG
4	Divers CTD	5	NG
1	digestion métaux/contaminants	5	ES
3	prototypes SCAF	10	NG
1	spectrocolorimetre + thermoréacteur (WTW S12 ou Hach DR 1900 ou 3900)	6	JN
1	secchi disk	0.2	NG
	GEOPHYSICAL EQUIPMENT FROM IGE (temporary)		
1	electromagnetic device EM PROMIS	80	MD
1	electromagnetic device TDEM TEMFAST	40	MD
1	Magnetic Resonance device MRS NUMIS Lite	130	MD
1	Electrical Tomography ERT	79	MD
	Total	408	

Quantity	Equipments		
HCMUT		cost k€	whos in charge
1	AAS	35	FENR-Tam
1	TOC / TN analyser	28	FENR-Tam
1	LC-UV-fluorescence	20	FENR-Tam
1	GC-MS	50	FENR-Tam

1	ICP-AES	95	FENR-Tam
1	GC - FID	40	FENR-Tam
1	Evaporateur rotatif	10	FENR-Tam
1	Flow meter	2	FCE
1	Transmissivity apparatus	15	FCE
1	Portable permeability analyser	5	FCE
1	Analyzer for 6 parameters in water	2	FCE
1	ICP-MS	150	FChe
1	GC-MS	54.8	FChe
1	LC-MS-MS	85	FChe
1	Microwave reaction system	8,5	FChe
1	High Performance Computer HPC	1	FSTI
1	set of sieving	0.2	FEnvironment-Hanh
1	Pompe péristaltique	1	Khoi
	Total	547,5	

Details are presented in
https://docs.google.com/spreadsheets/d/1wMhWt9Kbt0Zz9Z9S5hIFAcpNmTfkzqt9BwG-p7GkG_s/edit#gid=1560406739

Appendix 6 : Budget

Activities	2013	2014	2015	2016	2017	2018	2019	2020
Infrastructure	62.5		25	5	5	5	5	5
Equipment		40	20	5	6,34	10	*10*	*30*
Research projects	212	152	84	165	1241,3	37,2	*170*	*170*
Scholarships		113	195	188	110	110	*110*	*110*
Operation		25	28	28	*32*	*32*	*36*	*40*
Total	*274,5*	*329,5*	*352,4*	*390,5*	*1394,6*	*194,2*	*361*	*355*

Table A6a : SUMMARY FINANCIAL STATEMENT 2013-2017 and expectations 2018-2020 (in k€)

Stakeholders (k€)	2019	2020	2021	2022	2023
Staff and building HCMUT-VNU	20	20	20	20	20
internal scientific call for projects (amount fixed by HCMUT-VNU CARE)	20	20	20	20	20
Base dotations from UMRs (IGE for now, but could increase if more UMRs funds)	16	16	16	16	16
Grenoble-INP	6-10	6-10	6-10	6-10	6-10
Companies and French Embassy (Artelia, CNR, Vinci, Vucico and Wality)*	8	8	8	?	?
Budget requested for LE CARE-IJL**	**8**	**8**	**10**	**10**	**10**

* This financial contribution will be paid if the research center is labeled

**This budget aims at funding : 1 annual meeting (3k€), 1 master internships (3k€), 1 visit of 10 days FR VN for the governance (2k€)

Table A6b : Financial support by the different partners

Tableau 1. Funding obtained by scientists on projects (italics are submitted)

From scientific projects (K€)	2016	2017	2018	2019	2020	2021
IAEA Isotope			10k€	10k€	10k€	5k€
ANR Chrono-Risk				*680k€* to be resubmitted		
IGE Call for project C.Baduel			15.5k€			
OSUG-Support training school Descloitres LABEX OSUG@2020			10k€	8k€		

EC2CO, projets obtenus fin 2016		26k€	25k€	*30k€*		
Région Auvergne Rhône Alpes	38k€	73k€	-	*38k€*	-	
AUF (gestionnaire IP-HCMV)	6k€	20k€		*15k€*	-	
Mécénat ambassade de Suisse au Vietnam (gestionnaire HCMUT)	46k€	-	-	-	-	
AFD/UE : LMDCZ project (gestionnaire Southern Institute of Water Resources Research / scientif coord. P.Marchesiello)	-	1200k€	-	-	-	
RESCIF Seed Money / Etu RESCIF (gestionnaire EPFL-Suisse)	35k€	12k€	?	?	?	?
GIST Corée du Sud (gestionnaire IP-HCMV)	30k€	30k€	-	-	-	
ANR SCAF (gestionnaire IRD LTHE)	5k€	5k€	-	-	-	

Appendix 7a Avis des directeurs d'unités impliqués dans le projet de IJL

.

IGE
Institut des géosciences de l'environnement

A la commission d'audition des projets LMI 2018

Aux départements scientifiques DISCO et OCEANS

Grenoble, 26 juin 2018

Objet : Lettre de soutien au projet de **LMI « LE CARE-IJL »** porté par l'IGE

*Préambule : L'IGE est impliqué cette année dans le portage de trois projets de LMI soumis en réponse à l'appel à propositions 2018 (REZOC, NEXUS, LE CARE-IJL). Consciente des interrogations que pourraient susciter ces réponses multiples dans un contexte de possibilités financières contraintes, la Direction de l'IGE souhaite préciser d'emblée que le projet « **REZOC** » au Bénin se positionne sur une demande « standard » (i.e phase de démarrage nécessitant un financement complet) et a été incité à se représenter cette année suite aux recommandations qui lui ont été faites l'an dernier. Les deux autres projets, « **LE CARE-IJL** » au Vietnam, objet de cette lettre de soutien, et « **NEXUS** » en Côte d'Ivoire, se positionnent dans une logique de « labélisation » dans l'optique d'une contribution mineure au dispositif LMI étant donné qu'ils bénéficient déjà de co-financements significatifs de nos partenaires du Sud. Ces trois projets sont bien dimensionnés par rapport à l'effectif global de l'unité, reposent sur un nombre d'ETP que nous jugeons suffisant pour les mener à bien, et impliquent des personnels de l'UGA, Grenoble-INP et du CNRS. Ces trois projets constituent une structuration globale de notre effort de recherche ainsi qu'un renforcement durable de nos partenariats sur nos chantiers sud « Afrique de l'Ouest » et « Vietnam ».*

Le projet de LMI **« LE CARE-IJL »** est co-porté par l'Université Technologique d'Ho Chi Minh Ville avec quatre facultés impliquées et au nord par l'IGE, associant étroitement les unités G-Eau, LEGOS, MIO. Ce projet permet de structurer des recherches *sur les vulnérabilités des eaux des zones littorales et deltaïques* en s'appuyant sur le centre CARE (http://carerescif.hcmut.edu.vn/fr/) soutenu par le réseau des écoles d'ingénieurs francophones RESCIF, et contribue au PSIP « Zones Littorales ». Le LMI se positionne dans une logique d'aller au-delà d'une première phase d'incubation et souhaite obtenir l'engagement de l'IRD par *une labellisation qui apportera une visibilité accrue,* particulièrement importante pour nos partenaires du Vietnam et Grenoble–INP, tutelle de l'IGE. Le Vietnam s'engageant déjà fortement, la contribution demandée au dispositif LMI est réduite. Bénéficiant d'un recrutement récent à l'IGE d'une jeune chercheure (C. Baduel), le projet présente quatre atouts principaux pour l'IGE : a) il s'inscrit pleinement dans les priorités scientifiques fondatrices de l'unité; b) il porte des *enjeux partenariaux importants* en renforçant l'engagement de nos tutelles IRD et Grenoble-INP, c) il fait appel *un groupe significatif de sept chercheurs* de l'IGE et permet de nouvelles interactions avec d'autres UMRs et d) il permet de créer *la dynamique de projet et d'encadrement doctoral nécessaire à la conduite des recherches* d'une équipe (HyDrimZ) sur la qualité de la zone critique dans une zone côtière très vulnérable. La Direction juge donc ce projet de première importance pour le prochain contrat quinquennal et le soutiendra notamment par la dotation du chantier sud IGE « Vietnam ».

Pierre Brasseur,

Directeur de l'IGE

Direction
Pierre Brasseur

Sandrine ANQUETIN, directrice adjoint
Marc DESCLOITRES, directeur adjoint
Gaël DURAND, directeur adjoint
Jean-Luc JAFFREZO, directeur adjoint

Administration
Carole BIENVENU
Responsable administrative et financière

Valérie LANARI, adjointe

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INSTITUT MEDITERRANEEN D'OCEANOLOGIE (M.I.O)
UMR 7294 CNRS, UMR 235 IRD, UM 110 AMU

AIX MARSEILLE UNIVERSITE (AMU)
UNIVERSITE DE TOULON (UTLN)
OBSERVATOIRE DES SCIENCES DE L'UNIVERS (OSU) – INSTITUT PYTHEAS

Monsieur JP. MOATTI
Président Directeur Général de l'IRD
Le Sextant
44 boulevard de Dunkerque – CS 90009
13572 Marseille Cedex 02

Marseille, le 20 juin 2018

Monsieur le Président,

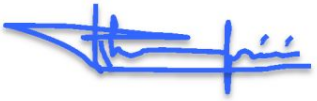
L'Institut Méditerranéen d'Océanologie (M I O, UMR IRD 235) investit en 2018 un nouveau chantier au Vietnam avec extension à la région du Sud-Est Asiatique. Dans une logique de recherche de cohésion des activités de recherche conduites par les UMR IRD impliquées sur l'étude de l'anthropisation du continuum entre eaux continentales et marines, le M I O a souhaité être associé à l'initiative de LMI International Joint Laboratory (IJL) lié au Centre Asiatique de Recherche sur l'EAU (CARE).

Le nouveau contrat quinquennal de l'UMR M I O très favorablement évalué par l'HCERES et agréé par les tutelles, dont la direction générale de l'IRD bien évidemment, prévoit l'ouverture d'un nouveau chantier géographique au Vietnam. Nos thématiques de recherche y seront centrées sur le rôle du carbone suie (Black carbon) sur le cycle du carbone et le transfert des contaminants (GDRI et projet H2020 SOOT-SEA), d'une part, et le devenir des plastiques dans le milieu aquatique (projet JEAI PLASTIC), d'autre part. Le transfert en cours d'Emilie Strady de l'UMR Institut des Géosciences de l'Environnement (IGE, UMR IRD 252) vers l'UMR M I O vient fort opportunément renforcer les indispensables liens interdisciplinaires qui doivent être tissés entre les ressources mobilisées au Vietnam par les équipes IRD et ses partenaires sud. Même si elle reste à ce stade encore modeste, la participation du M I O au LMI IJL permet d'envisager une complémentarité nécessaire entre les différents programmes et outils structurant de la recherche pour le Sud tout en évitant les redondances scientifiques. Cette dynamique interdisciplinaire qui associe les départements OCEANS et DISCO doit permettre

MIO, Campus de Luminy – OCEANOMED, Bâtiment Méditerranée 163 avenue de Luminy, 13288 Marseille Cedex 9
Tél. : 04 860 90 589 ; E-mail : dominique.poirot@mio.osupytheas.fr

d'augmenter la cohésion et l'efficacité des actions prévues et par voie de conséquence d'en augmenter la cohérence et la visibilité.

Sur la base de ce constat scientifique et stratégique fort, je vous fais donc part de mon soutien total au projet de LMI IJL dans lequel le M I O saura jouer le rôle qui lui est réservé.



Richard SEMPERE
Directeur du MIO

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34196 Montpellier Cedex 5
tél / fax : +33 (0)4 67 16 64 39 / 40

Montpellier, June 29, 2018

Olivier Barreteau
& Jean-Christophe Poussin to **IJL project LE CARE**

Support letter to the IJL project LE CARE

We strongly support the IJL "LE CARE" initiative dedicated to the study of low elevation coastal zones in the south of Vietnam, analysis of water resources and evolutions, driven by Nguyen Phuoc Dan (Faculty of Environment and Natural Resources) and Nicolas Gratiot (IRD).

G-EAU is involved in the IJL to conduct interdisciplinary research activities on water issues over various regions in rural and urban contexts. The South East Asian area is a historical site of investigations, with a growing interest over the past few years. Joining the IJL LE CARE initiative is thus in-line with the strategy of the research unit; to develop its activities in the Mekong Delta region.

The Doubt project (Deltas' dealings with uncertainty: Multiple practices and knowledges of delta governance, 2016-2019, EU ORA) started a real dynamic of submission of project proposals involving interdisciplinary approaches on the analysis of water resource and its evolution in Cambodia and Vietnam. Some of them are already successful, e.g. Isotope LECZ, involving future members of the IJL and showing the complementarity of the future consortium. A strong partnership already exists with the Royal University of Agriculture (JEAI ECOLAND) for social sciences and is developed with the Institute of Technology of Cambodia for natural sciences. In that sense, G-EAU is sharing the objectives of the IJL initiative and the researcher involved will logically contribute to the societal questions addressed by LE CARE, bringing the complementary focus in the Cambodian region.

Many of the knowledge gaps on water resources in the Mekong Delta reflect a lack of comprehensive information on groundwater resources. G-EAU researchers will contribute to the IJL LE CARE by working on research themes that address this issue, including: (i) the impacts of surface water-aquifer interactions, and water and land management on the transfer of contaminants; (ii) the current risks for water resources in areas exposed to water-table drawdown; and (iii) the sustainability of groundwater resources, and how river-aquifer and aquifer-aquifer relationships affect water resource vulnerability. Through research projects dedicated to these themes, G-EAU will contribute to the training of students (including masters and doctorate) in the disciplines of hydrochemistry and hydrogeology. This collaboration will also promote the international outreach of local partners, interdisciplinary dialogue, innovation, and dissemination of results.

Dr Olivier Barreteau Dr Jean-Christophe Poussin

Laboratoire d'Etudes en Géophysique et Océanographie Spatiales
UMR 5566 (CNES-CNRS-IRD-UPS)

Observatoire Midi-Pyrénées

Alexandre Ganachaud
Directeur du LEGOS
E-mail : directeur@legos.obs-mip.fr
Tel (sec.): +33(0)561332902

Toulouse, le 4 juillet 2018

à

M. JP Moatti
Président Directeur Général de l'IRD
Le Sextant, 44 Bld de Dunkerque
13573 Marseille Cedex 02

Objet : Soutien

Monsieur le Président,

Le Laboratoire d'Etudes en Géophysique et Océanographie Spatiales (LEGOS), est investi au Vietnam depuis 2007 avec la création de l'USTH à Hanoi en 2009 ; l'établissement du LMI LOTUS en 2018 puis la participation aux activités du Centre Asiatique de Recherche sur l'EAU (CARE) depuis 2015 (affectation de P. Marchesiello ; MLD de R. Benshila). Le LEGOS est impliqué sur les thématiques de modélisation des estuaires, et développe des systèmes de modélisation spécifiques, ainsi que des systèmes d'observation d'érosion côtière qui sont déployés sur plusieurs de nos chantiers sud. Nous avons étudié la zone du Lower Mekong depuis plusieurs années avec nos partenaires de l'Université d'Ho Chi Mihn, du CARE et de l'IGE, et souhaitons continuer à nous investir sur ce chantier.

Je soutiens sans réserve la mise en place du LMI CARE qui offrira une plate forme de renforcement de nos collaborations et des échanges, formation et production scientifique avec nos partenaires sur un terrain littoral et multi disciplinaire.

Alexandre GANACHAUD
Directeur du LEGOS
UMR 5566 CNES/CNRS/IRD/UPS

Affaire suivie par :
Laura GUILLAMET – Assistante VP Recherche
DRIVE - Direction Recherche Innovation Valorisation Europe
laura.guillamet@grenoble-inp.fr - Tél : 04 76 57 47 53

Objet : Soutien de Grenoble INP à la labellisation du CARE

Jean-Paul MOATTI,
Président-Directeur général
IRD
Le Sextant
44, bd de Dunkerque, CS 90009
13572 Marseille cedex 02

Monsieur,

La labellisation « Laboratoire Mixte International – LMI » du laboratoire CARE (Centre Asiatique de Recherches sur l'Eau) est une nouvelle étape importante pour asseoir dans la durée, l'attractivité et la visibilité du CARE via l'engagement, ainsi accru, des différents organismes et établissements (IRD, HCM-UT, Grenoble INP), celui-ci se traduit déjà concrètement par l'affectation de ressources significatives. Ce label serait un signe fort de reconnaissance et d'encouragement de l'implication et du dynamisme des chercheurs et des personnels techniques et administratifs dans la réalisation de projets scientifiques de qualité et également dans le développement du CARE sur une thématique cruciale pour l'humanité au 21ème siècle.

L'institut polytechnique de Grenoble est un des fondateurs du laboratoire CARE initié dans le cadre du réseau RESCIF. Ce laboratoire impliquait initialement le laboratoire IGE (IRD, CNRS, UGA, Grenoble INP) sur le site grenoblois et deux membres fondateurs de RESCIF (Grenoble INP et HCM-UT). Son développement est un très bon exemple de projet fédérateur et structurant, il a récemment permis d'associer de nouvelles structures au projet : le LEGI, LCIS et ISterre (les deux premiers laboratoires ayant Grenoble INP comme tutelle), des membres de RESCIF : EPFL, UCLouvain, PolyMontréal, et trois UMR sous tutelle IRD : LEGOS, G-Eau, MIO.

Ce rôle intégrateur est très important pour Grenoble INP qui a depuis le début apporté un soutien infaillible au travers notamment de l'affectation de deux allocations de recherche « Présidence » depuis 2014, du financement récent de jouvence ou d'achat d'équipements scientifiques pour un montant de 40 k€.

Grenoble INP
46 avenue Félix Viallet
F-38031 Grenoble Cedex 1
Tél +33 (0)4 76 57 45 00
Fax +33 (0)4 76 57 45 01
www.grenoble-inp.fr

Grenoble INP a également soutenu le CARE via la mise à disposition d'un enseignant-chercheur dans le cadre d'un CRCT accordé à Julien Nemery (prolongé ensuite en délégation IRD), une dotation annuelle comprise entre 6 k€ et 10 k€, des visites de la direction de l'établissement (VP Recherche, Administrateur général) et également en favorisant les projets du CARE dans le cadre d'appels à projets menés par la région Auvergne-Rhône-Alpes, etc.

La labellisation permettrait donc à Grenoble INP d'avoir un argument visible et de reconnaissance auprès des autres laboratoires du site grenoblois pour consolider ce choix politique de soutien de son développement à l'international, notamment au Vietnam. Le CARE contribue aussi à apporter une dynamique forte pour la formation via l'accueil d'étudiants stagiaires, la création du MOOC « Des rivières et des hommes », premier MOOC créé par Grenoble INP avec son service Perform avec près de 10 000 inscrits en quatre ans.
Pour l'ensemble de ces raisons, Grenoble INP soutient très fortement la demande portée par l'IGE de labellisation par l'IRD du laboratoire CARE en LMI.

Je vous prie d'agréer Monsieur, l'expression de mes salutations distinguées.

Frédéric Dufour
Vice-président du conseil scientifique et de la recherche
Institut polytechnique de Grenoble

Appendix 7b: cover letter from HCMUT

VIETNAM NATIONAL UNIVERSITY - HCMC
HO CHI MINH CITY UNIVERSITY OF TECHNOLOGY
268 Ly Thuong Kiet St., Dist.10 - Ho Chi Minh City - VIETNAM
ĐT : 84.8.8652442 - Fax : 84.8.8653 823 - Email : inter@hcmut.edu.vn

June 4th, 2018

Subject: *In-kind contribution from HCMUT for the project on "International Joint Laboratory"*

To: **Institut de Recherche pour le Développement- France (IRD)**

Dear Sir/Madame,

Asian Center for Water Research (CARE: Centre Asiatique de Recherche Sur L'Eau) was established by Ho Chi Minh City University of Technology (HCMUT) in 2013 with as strong support from the RESCIF network and IRD.

CARE now serves as a hub to boost international collaborations on the water field related issues concerning the Low Elevation Coastal Zone (LECZ) and aquifer systems in the South of Vietnam. The achievements from international joint research activity as well as foreign student exchange in the recent years has shown that CARE has become our most dynamic International Research Center on the campus, which help HCMUT to strengthen strategic research-based education.

The proposal on "the resiliency and evolution of the LECZ and aquifer systems in the South of Vietnam" that was jointly prepared by colleagues from IRD, CARE-HCMUT and Grenoble INP aims to find adapted measures to mitigate water pollution and hazard risks of erosion, flooding and saltwater intrusion. Understanding and adapting to the ongoing human-induced and climate changes is a priority for the sustainable development of Ho Chi Minh City and the region. CARE laboratory actively contributes to this national priority.

Through this letter, I would like to express my full support for the labellisation of CARE as an International Joint Laboratory of IRD. HCMUT is anticipating CARE laboratory as becoming a perennial structure for research, education and transfer of technologies. In collaboration with IRD and partners, HCM-UT will support CARE development, by offering in-kind contribution including local expertise and researchers, staff time, supporting staff and students' assistance, facilities of CARE as well as others of HCMUT (laboratory, meeting rooms, class rooms, etc.) and logistic works to ensure that CARE will develop in the best efficient way.

Sincerely yours,

Prof. Mai Thanh Phong

Rector of Ho Chi Minh City University of Technology

TRƯỜNG ĐẠI HỌC BÁCH KHOA

Assoc.Prof.Dr MAI THANH PHONG
RECTOR

Appendix 8a : support letter from DISCO and Grenoble INP (16 mai 2017)

Institut de Recherche pour le Développement FRANCE

Grenoble INP

Le Directeur du Département Dynamiques internes et de surface des continents de l'Institut de Recherche pour le Développement

Le Vice-Président du Conseil scientifique et de la recherche de Grenoble INP

A

Madame la Directrice CARE-RESCIF
Centre Asiatique de Recherche sur l'Eau
268 Ly Thuong Kiet, Dist 10, Hochiminh City

Le 16 mai 2017

Objet : soutien au projet Centre Asiatique de Recherches sur l'Eau (CARE)

Madame la Directrice,

Lancé en 2013 dans le cadre du réseau international des écoles d'ingénieurs de la francophonie RESCIF, le CARE associe les équipes de recherche de l'Université Technologique d'Ho-Chi-Minh Ville (HCM-UT) et de l'Institut des Géosciences de l'Environnement (IGE), placé notamment sous la tutelle de Grenoble INP et de l'IRD, sur la thématique de la gestion durable des ressources en eau et des risques hydrologiques dans le continuum mégapole de Ho-Chi-Minh Ville – rivière Saigon - delta du Mékong.
Les questionnements scientifiques portés par le CARE sont au cœur des objectifs mondiaux du développement durable 11 : « Dynamiques urbaines/villes durables » ; 6 : « Assurer une gestion durable des ressources en eau » et 13 : « lutter contre les changements climatiques et leurs répercussions ». Ils s'inscrivent en outre pleinement dans le thème de la vulnérabilité des zones deltaïques et littorales que l'IRD a identifié comme l'un des programmes scientifiques interdisciplinaires à mettre en œuvre pour les prochaines années ainsi que dans le défi sociétal Environnement qui est un des cinq enjeux soutenus par Grenoble INP.
Le CARE constitue d'ores et déjà un important chantier en Asie du Sud-Est pour l'IRD comme pour Grenoble INP en relation avec le Programme de Formation d'Ingénieurs d'Excellence au Vietnam, sur lequel nos établissements ont mobilisé depuis 2014 d'importants moyens financiers : 7 ans cumulés -portés à 11 ans à la fin 2019- d'expatriation de chercheurs, un poste de volontaire international, 3 postes de personnels locaux, 3 bourses de thèse (et 4 bourses financées par l'université Grenoble Alpes, autre tutelle de l'IGE), plus de 70.000€ d'équipements pour la

plateforme scientifique, mais également une contribution directe annuelle de 6.000€ à 10.000€ pour Grenoble INP et de 15.000€ pour l'IRD depuis 2015.

L'IRD et Grenoble INP entendent poursuivre leur soutien à la structuration et à l'émergence du CARE comme centre de recherche et de formation de référence sur la gestion des ressources en eau dans le bassin du Mékong.

Veuillez agréer, Madame la Directrice, l'expression de nos plus cordiales salutations.

Philippe CHARVIS
Directeur du Département Dynamiques internes et de surface des continents – IRD

Frédéric DUFOUR
Vice-président
du conseil scientifique
de l'Institut polytechnique de Grenoble **Frédéric DUFOUR**
Vice-Président du Conseil scientifique et de la recherche – Grenoble INP

Copie :
Monsieur le Directeur de l'Institut des Géosciences de l'Environnement (IGE)
Monsieur le Représentant de l'IRD au Vietnam
Monsieur Nicolas Gratiot, Président du comité scientifique du CARE-RESCIF
Monsieur Georges Vachaud, Conseiller stratégique CARE-RESCIF

Appendix 8b : support fund from Grenoble INP , 1 new PhD scholarship for 2018-2021 (5 juin 2018)

Direction Recherche Innovation Valorisation Europe
Affaire suivie par :
Laura GUILLAMET, Nancy IACONO
Tél : 04 76 57 47 53, 04 76 57 45 27
aap-vie-scientifique@grenoble-inp.fr
Réf : AAP_BDP 2018/LG-NI

Monsieur Julien NEMERY
IGE

Grenoble, le 5 juin 2018

Objet : Appel à projets Bourses doctorales Présidence Grenoble INP 2018

Cher collègue,

Nous avons le plaisir de vous informer que le Bureau politique Recherche & Valorisation de Grenoble INP, réuni le 14 mai 2018, a émis un avis favorable au dossier que vous avez déposé dans le cadre de l'appel à projets Bourses doctorales Présidence Grenoble INP 2018.

A ce titre, Grenoble INP vous attribue :

Une Allocation De Recherche – 1 ADR

pour le projet de recherche de thèse : « Modeling of nutrients dynamics in a tidal river system and application to eutrophication risk management ».

En vous attribuant cette bourse doctorale, Grenoble INP soutient votre projet et souhaite consolider son engagement auprès du laboratoire CARE.

Nous vous remercions par avance de nous retourner dans les plus brefs délais le tableau ci-joint dument complété afin que nous puissions le transmettre à l'école doctorale concernée. Nous vous invitons ensuite à prendre contact avec l'école doctorale TUE afin de procéder au recrutement. La sélection du candidat devra s'effectuer avant le 31 août 2018. Passée cette date, cette bourse ne sera plus affectée à votre projet, le support sera alors attribué à l'école doctorale TUE.

Je vous prie d'agréer, cher collègue, nos meilleures salutations.

Grenoble INP

46, avenue Félix Viallet
F-38031 Grenoble Cedex 1

Tél +33 (0)4 76 57 45 00
Fax +33 (0)4 76 57 45 01

www.grenoble-inp.fr

Frédéric DUFOUR
Vice-président du conseil scientifique et de la recherche
de l'Institut polytechnique de Grenoble

Copie :
- Directeur du laboratoire
- Directeur du conseil des études doctorales
- Directeur de l'école doctorale TUE
- Responsable administratif du laboratoire
- Gestionnaire finances du laboratoire
- Marc AUROUSSEAU, Directeur scientifique Environnement et production éco-efficiente

Appendix 8c : support funds and letter from the French Embassy

Liberté • Égalité • Fraternité
RÉPUBLIQUE FRANÇAISE

AMBASSADE DE FRANCE AU VIETNAM

Le Conseiller de Coopération et d'Action culturelle,
Directeur de l'Institut français du Vietnam

N° 2018 – 1346725

Hanoï, le 1er juin 2018

Objet : Courrier de demande de subvention daté du 31 mai 2018

Monsieur le Directeur,

J'ai bien pris connaissance de votre courrier de demande de subvention daté du 31 mai 2018, qui fait suite à la réunion de travail du 2 avril 2018, animée et présidée par le Consul Général de France à Ho Chi Minh-Ville.

Le Président de la République française et le Secrétaire général du Parti communiste vietnamien ont eu l'occasion de le souligner récemment : la question du développement durable, et en particulier de l'eau, est au cœur du partenariat entre nos deux pays. Le CARE et les chercheurs de l'Institut de recherche pour le développement qu'il abrite constitue une structure d'excellence de la recherche française qui y œuvre à HCMV.

A ce titre, et en accompagnement des partenariats mis en place par le CARE avec des entreprises françaises et vietnamiennes du secteur de l'eau, consolidant sa candidature au label « Laboratoire Mixte International », nous avons le plaisir de vous annoncer un engagement de l'Ambassade de France au Vietnam, à hauteur de 3000 (trois mille) euros pour l'année 2019. Cet engagement pourra être renouvelé pour un même montant en 2020 et 2021 en fonction du montant des crédits d'intervention attribués par le Ministère de l'Europe et des Affaires étrangères.

Je vous prie d'agréer, Monsieur le Directeur, l'expression de mes salutations distinguées.

Etienne ROLLAND-PIEGUE

Monsieur Nicolas Gratiot
Directeur de recherche à l'IRD
Directeur scientifique du CARE

Ambassade de France au Vietnam
57 Tran Hung Dao, Hanoi, Vietnam Tel : 024 39 44 57 00
ambafrance.hanoi@diplomatie.gouv.fr www.ambafrance-vn.org

Appendix 8d : support funds and letter from private companies

CNR INGÉNIERIE

Centre Asiatique de Recherche sur l'Eau
CARE-Rescif
Institut Polytechnique de HoChiMinh ville
Truong Đai hoc Bach Khoa- ĐHQG TP.HCM
268 Ly Thuong Kiet, P 14, Q. 10, Tp. Ho Chi Minh,
VIETNAM

A l'attention de Monsieur N. Gratiot,
Directeur scientifique

Lyon, le 10 avril 2018

Notre référence : 18-389 DJO/JME
Affaire suivie par : Jérôme MENTRE
Téléphone : (+84) 243 715 23 44 - (+84) 120 554 78 57
E-Mail : ingenierie@cnr.tm.fr / j.mentre@cnr.tm.fr

Objet : Centre Asiatique pour le Recherche sur l'Eau - partenariat

Cher Monsieur Gratiot,

Nous faisons suite à la séance de travail du 2 avril 2018, présidée et animée par le Consul Général de France, et à vos échanges préalables avec Mr Mentré qui représente CNR au Vietnam.

La Compagnie Nationale du Rhône est non seulement premier producteur Français d'énergie renouvelable, mais aussi consultant technique en aménagements hydrauliques et fluviaux. Certaines de nos thématiques sont communes avec CARE, notamment en ce qui concerne les aspects "EAU & RISQUE", et font partie des axes de développement de CNR Ingénierie en Asie du Sud-Est.

A ce titre, et afin de permettre au CARE d'accéder à la labellisation comme «Laboratoire Mixte International», nous vous confirmons l'engagement de CNR, sur une période de trois ans, pour une participation "de niveau 1" tel qu'énoncé dans votre proposition de lettre d'engagement datée du 3 avril 2018.

A travers ce mécénat, la CNR a la volonté de promouvoir nos activités communes, de rendre actif le partenariat Université-recherche-entreprise, et de développer nos associations commerciales pour répondre aux demandes d'expertises techniques des bailleurs de fonds dans la région.

Dans l'attente de recevoir de vos nouvelles prochainement, nous vous vous transmettons nos meilleures salutations.

COMPAGNIE NATIONALE DU RHONE
Direction de l'Ingénierie et Grands Projets
Le Directeur

COMPAGNIE NATIONALE DU RHÔNE

Daniel JOUVE

ARTELIA

Passion & Solutions

Centre Asiatique de Recherche sur l'Eau CARE-Rescif
Institut Polytechnique de Ho Chi Minh ville
Trường Đại học Bách Khoa-ĐHQG Tp. HCM
268 Ly Thuong Kiet, P.14, Q.10, Tp. Ho Chi Minh,
Viet Nam

À l'attention de Monsieur Nicolas Gratiot
Directeur scientifique

Ho Chi Minh Ville, le 07 Mai 2018

Objet : Centre Asiatique pour le Recherche sur l'Eau - partenariat

Cher Monsieur Gratiot,

Artelia Viet Nam est une filiale du groupe ARTELIA - un leader de l'ingénierie indépendante européenne, spécialisé dans les domaines du Bâtiment, de l'Industrie, des Barrages, du Maritime, du Développement urbain et des Transports, mais aussi consultant technique de l'Energie, Eau et de l'Environnement. Les problématiques environnementales sont au cœur de nos préoccupations et notamment sur tous les projets au Vietnam.

C'est pourquoi, et afin de permettre au CARE d'accéder à la labellisation comme "Laboratoire Mixte International", nous vous confirmons l'engagement de Artelia Vietnam, sur une période de trois ans, pour une participation "de niveau 1" tel qu'énoncé dans votre proposition de lettre d'engagement en date du 26 avril 2018.

Au travers de ce mécénat, Artelia Vietnam souhaite promouvoir ses activités communes, de rendre plus actif localement le partenariat Entreprises - Université, notamment avec l'université technique de Ho Chi Minh Ville, sont une partie non négligeables de nos 500 ingénieurs vietnamiens sont issus et de coordonner nos actions commerciales pour répondre aux diverses demandes d'expertises techniques.

Cordialement,

0305343837 C.T.T.N.H.H
CÔNG TY TNHH ARTELIA VIỆT NAM
TP. HỒ CHÍ MINH

Matthieu Bonnet
Directeur Général

De NAM HA

Sujet **RE: mécénat CARE Entreprises**

Pour nicolas gratiot, 'tuan vo'

Copie à 'Võ Anh Tuan'

Dear Nicolas,
Sorry that I cannot read French. Do you have English version?
In order to process the sponsorship, please help to provide:
- Account name and number for bank transfer
- Can you issue an invoice for this?
Many thanks

Best regards,
Lại Nam Hà
M: (+84) 988 281 581

VUCICO VIETNAM – Sailing Tower, Tầng 16, Phòng 1603
111A Pasteur, P. Bến Nghé, Q. 1, TP. Hồ Chí Minh, Việt Nam
T +84 (28) 3933 0822 F +84 (28) 3933 0821 www.vucico.com

VUCICO VIETNAM | PREMIUM WATER INFRASTRUCTURE PARTNERS

From: nicolas gratiot [mailto:nicolas.gratiot@ird.fr]
Sent: Friday, April 27, 2018 8:35 AM
To: tuan vo
Cc: Võ Anh Tuan; NAM HA
Subject: Re: mécénat CARE Entreprises

Cher Tuan,
this is a very good news!
I send you the letter again, so that you can follow the same format.
Thanks a lot and hope this will lead to further collaborations!
Nicolas
Ps. Mr Nam Ha, would you please confirm that you can read the attached file? Tks.

Centre Asiatique de Recherche sur l'Eau CARE-Rescif

Institut Polytechnique d'Ho Chi Minh Ville

268 Ly Thuong Kiet St, Dist. 10, Ho Chi Minh City

A l'intention de Monsieur Nicolas Gratiot,
directeur scientifique

Paris, le 28 juin 2018

Objet : Centre Asiatique de Recherche sur l'Eau

Cher Monsieur Gratiot,

Je fais suite à nos échanges des dernières semaines sur le sujet de l'accès à l'eau de boisson saine pour les personnes à bas revenus au Vietnam.

1001fontaines est une ONG française pionnière dans le domaine des « *water kiosks* ». Ces unités de production décentralisées d'eau de boisson de qualité permettent de rapprocher la production et la distribution d'eau potable des populations vulnérables. Après 15 années d'expérience et 200 kiosques en activité, 1001fontaines cherche désormais à se développer au Vietnam et lance ainsi le projet Wality.

Dans le cadre de l'étude de faisabilité de Wality, il sera essentiel pour à l'équipe projet de mieux comprendre et appréhender les enjeux de pollution des eaux consommées par les foyers à bas revenus.

C'est pourquoi nous avons le plaisir d'accompagner la demande de labellisation du CARE comme "Laboratoire Mixte International" avec un engagement, à hauteur de 1000 (mille) euros pour l'année 2019. Cet engagement pourra être renouvelé pour un même montant en 2020 et 2021, en fonction du budget alloué à Wality par 1001 fontaines et ses autres financeurs.

Nous espérons par cet engagement renforcer la collaboration entre 1001fontaines, Wality, le CARE et l'Institut Polytechnique d'Ho Chi Minh Ville dans les mois et années à venir.

Cordialement,

Romain Joly

CEO Wality Vietnam

6/28/2018 9:21:09 AM PDT

DocuSigned by:
Romain Joly
932B9944D74D43F...

Appendix 8e : Support letter from the general Secretariat of RESCIF network

CENTRE COOPERATION & DEVELOPPEMENT - CODEV

Chaire UNESCO de technologies en faveur du développement

CM 2
STATION 10
CH-1015 LAUSANNE

Tel: +41 21 693 60 12
E-mail: cooperation@epfl.ch
Web Site: http://cooperation.epfl.ch

ÉCOLE POLYTECHNIQUE FÉDÉRALE DE LAUSANNE

Yuri Changkakoti
Secrétaire Général du RESCIF
EPFL-E-ENT-CODEV
RESCIF
Station 10
1015 Lausanne
Tel : +41 21 693 6061
Email : rescif@epfl.ch
Web : rescif.net

Dr. Nicolas Gratiot
Co-directeur CARE
Institut National Polytechnique de Grenoble – Grenoble INP
46, Avenue Félix Viallet
F-38000 GRENOBLE
FRANCE

Lausanne, le 29 juin 2018

Soutien Secrétariat Général du RESCIF au projet de labelisation du CARE par l'IRD comme Laboratoire Mixte International (LMI)

Monsieur le Directeur,

Le réseau d'Excellence des Sciences de l'Ingénieur et des technologies de la Francophonie (RESCIF) a vu le jour dans le cadre du Sommet des chefs d'Etat et de Gouvernement de la Francophonie à Montreux, Suisse, en octobre 2010. Ce réseau est composé de quinze institutions académiques francophones du Nord et du Sud, toutes spécialisées dans les secteurs de l'ingénierie et de la technologie. Parmi les initiatives phares du RESCIF, figure la mise en œuvre de laboratoires conjoints. L'un d'entre eux est le Centre Asiatique de Recherche sur l'Eau (CARE) implanté à l'Institut Polytechnique de Ho Chi Minh Ville (IPHCM), et porté par Grenoble INP compte tenu de la très longue coopération existant entre les deux instituts et de l'expertise scientifique de Grenoble INP sur ce thème.

La région du Sud Est Asiatique connaît des défis sans précédents liés aux risques de changement climatique et aux pressions anthropiques. Ceux-ci incluent notamment, mais non exclusivement : i) submersion et intrusions salines dans les deltas; ii) traitement des rejets industriels et domestiques ; iii) estimation des flux de sédiments et de contaminants; et iv) développement urbain et réseaux de distribution d'eau. CARE vise à mettre en place des projets de *recherche et* de *formation,* incluant des programmes d'échanges internationaux, autour de problématiques liées à la région du Delta du Mékong, mais très représentatives de celles prévalant dans le Sud Est Asiatique. CARE vise également à contribuer au *transfert technologique* par le développement d'outils adaptés à la surveillance du milieu, à l'évaluation de son évolution et des risques associés. Le volet *transfert des connaissances* vers les décideurs régionaux et locaux, notamment en regard de la planification des mesures d'adaptation aux changements climatiques, aura vraisemblablement un impact fort sur la vie sociale et économique des habitants du Delta du Mékong.

La responsabilité scientifique du CARE est actuellement assurée par Dr. Nicolas Gratiot (DR IRD, IGE). Depuis 2012, ce chercheur a joué un rôle très actif non seulement au niveau de l'animation de l'équipe grenobloise, mais aussi dans l'ouverture à une collaboration pluri- partenaires intégrant des équipes de l'École Polytechnique Fédérale de Lausanne (EPFL) et de l'École Polytechnique de Montréal (EPM), et accueillant plusieurs autres membres Nord et Sud du consortium RESCIF. Grâce à cette ouverture, l'EPFL et l'EPM ont pu intégrer les volets *formation* et *transfert technologique,* renforçant d'autant les objectifs poursuivis par le volet *recherche.*

Nous jugeons que les prochaines années s'avéreront cruciales pour la mise en place du laboratoire conjoint CARE et la consolidation de la dimension multilatérale. Nous sommes persuadés que le succès d'une telle opération dépend notamment d'une présence effective de chercheurs sur place et d'un soutien pour développer la recherche et la formation (matériel, mobilité…). Pour cette raison, les partenaires fondateurs du CARE s'associent au recteur de l'Université HCMUT pour soutenir solennellement auprès de l'IRD un soutien pour le développement des activités du CARE.

Fait pour valoir ce que de droit,

Yuri Changkakoti

Secrétaire Général RESCIF

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Appendix 10 : liste des productions scientifiques et de vulgarisation sur la période 2013-2018

Mise à jour le 4 Juin 2018

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Appendix 11 : Example of short courses, Summer school and MOOC and PFIEV

IGE

Recherche

Formation

Observatoires

Les services

Sciences pour tous

Séminaires

Mesures Temps réel

Annuaire

Contact et localisation

Rechercher

OK

Laboratoire membre de :

OSUG

Atelier 'Water Quality Assessment' à Ho Chi Minh Ville

30 juin 2017

Workshop "Water Quality Assessment' à Ho Chi Minh Ville
Le workshop s'est tenu au CARE sur le campus HCMUT du 12 au 16 juin 2017
En 2017, une collaboration a été initiée entre le Centre Asiatique de Recherche sur L'eau (CARE) et le Department Of Natural Ressources and Environnement (DONRE) de la province d'Ho Chi Minh Ville. Le centre de monitoring du DONRE est responsable du suivi de la qualité de l'eau du bassin versant Saigon-Dong Nai Rivers mais également de l'air et des eaux souterraines. Cette collaboration vise à échanger des données de monitoring sur l'eau (qualité et hydrologie) et de l'expertise sur l'acquisition et la fiabilisation des bases de données. Dans ce cadre, Emilie Strady (CR IRD) et Julien Némery (Mcf Grenoble-INP en accueil IRD) tous deux chercheurs à l'IGE (équipe Hydrimz) et au CARE, ont assuré un workshop 'Water Quality Assessment' pour le personnel technique du centre de monitoring.
Au programme des cinq jours de formation :

- Bases en hydrologie des lacs, rivières et estuaires
- Les grands cycles biogéochimiques (carbone, azote, phosphore, métaux traces)
- Comment et pourquoi réaliser un monitoring de la qualité de l'eau ?
- Variabilité spatio temporelle des paramètres de qualité de l'eau ?
- Où, quand, comment bien échantillonner en milieu aquatique ?
- Analyses critiques des bases de données de qualité d'eau

Entre présentation en salle, mesures sur le terrain et au laboratoire et travail tutoré, le bon déroulement de la formation a été assuré grâce à une traduction en direct anglais-vietnamien assurée par Tuyet Thi Ngoc Nguyen (doctorante IGE-CARE) et Anh Truong Nguyen (staff technique CARE).

IGE

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Observatoires

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Sciences pour tous

Séminaires

Mesures Temps réel

Annuaire

Contact et localisation

Rechercher

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École de terrain Hydrogéophysique au Centre Asiatique de Recherche sur l'Eau au Vietnam 9-14 avril 2018

23 avril 2018, par Herve Denis

Une école de terrain « **Hydrogéophysique** » a été réalisée du 9 au 14 avril 2018 par l'IGE au Centre Asiatique de Recherche sur l'Eau au Vietnam (http://carerescif.hcmut.edu.vn/fr/) grâce à des co-financements issus du « **LABEX OSUG@2020** », du **CARE**, et des **facultés de Géologie et de l'Environnement de l'Université Technologique d'Ho Chi Minh City**.

Cette formation a réuni vingt étudiants de niveau Master 2 durant 6 jours. Elle était dédiée à l'apprentissage en mode « learning by doing » de deux des principales méthodes de géophysique appliquée à l'eau souterraine, les problèmes géotechniques, et les suivis de panaches de pollutions dans les sols : la tomographie de résistivité électrique et les sondages électromagnétiques temporels.

Etudiants vietnamiens devant le bâtiment du CARE

Organisée par Tran Anh Tu, Vice doyen (Faculty of Geology & Petroleum Engineering) et Marc Descloitres (IGE), avec l'appui du laboratoire CARE, la formation permettait de pratiquer ces méthodes directement sur le terrain, dans le delta du Mékong, sur un site test où le sous sol est gorgé par endroits d'argiles et d'eau salée dans les 30 premiers mètres de la surface, compromettant l'exploitation des aquifères superficiels. **Cette zone du delta du Mékong proche de la mer est aussi menacée par la montée des eaux de mer et un affaissement progressif des terrains qui conduiront probablement à la submersion, à moyen terme, d'une partie des terres fertiles du Delta**.

GRENOBLE INP FORMATION RECHERCHE INTERNATIONAL ENTREPRISES VIE ÉTUDIANTE

MOOC « Des rivières et des hommes », saison 4 : le succès se confirme !

Publié le 12 février 2018

Les saisons passent, et le succès du MOOC des rivières et des hommes ne se dément pas. Bien au contraire ! Le nombre d'apprenants a cette année battu des records, atteignant plus de 4200 inscrits.

INP_Carrousel-MOOC.jpg

Il faut dire que les thématiques au cœur des enseignements sont plus que jamais d'actualité : la multiplication des inondations exceptionnelles partout dans le monde n'a de cesse de nous rappeler que la gestion des rivières est un enjeu majeur de nos sociétés.

Le MOOC, qui aborde la dynamique des rivières aménagées à partir d'exemples de terrain présentant un intérêt avéré tant pour les pays du Sud que du Nord (Bénin, France, Mexique, Vietnam, etc.), permet aux apprenants de parfaire et d'enrichir leurs connaissances dans les domaines de l'hydrologie et de la qualité de l'eau, de l'hydraulique et de la géomorphologie fluviale, appliquées à la gestion des rivières. Il propose des savoir-faire méthodologiques et techniques pour évaluer l'état des cours d'eau et envisager des interventions transposables aux différents environnements au Nord comme au Sud.

Le Viêt-Nam joue le jeu

Les cours, dispensés en français, sont sous-titrés en anglais et en vietnamien. Cette année, le Viêt-Nam est d'ailleurs le troisième pays représenté après la France et le Maroc, ce qui nous encourage à poursuivre les efforts de traduction. Les enseignants-chercheurs du pays n'hésitent pas à utiliser le MOOC dans leur formation, mixant de plus en plus apprentissage en mode virtuel et apprentissage en présentiel. La collaboration étroite entre Grenoble INP et l'Ho Chi Minh University of Technology explique sûrement cet engouement (exemple de collaboration : la Fondation Grenoble INP soutient le projet RESCIF CARE au Vietnam).

La grande majorité des apprenants a suivi le MOOC en formation continue, à domicile, le week-end : 72,2% ont un âge compris entre 20 et 40 ans (contre 91,4% pour la session 3), et 46,5% un âge compris entre 20 et 30 ans. La majorité d'entre eux a déjà un niveau d'études Bac + 5.

Quel que soit leur objectif en s'inscrivant à ces cours en ligne, les apprenants semblent satisfaits : 89% de ceux qui ont répondu au sondage de fin de session (245 réponses) évaluent le MOOC « 4 et + sur une échelle de 1 à 5 » (chiffre

stable par rapport aux sessions précédentes). Enfin, les deux tiers d'entre eux estiment avoir atteint ou dépassé leurs objectifs d'apprentissage.

Si vous avez raté cette session 4, retrouvez le MOOC « Des rivières et des hommes » à la rentrée 2018 !

Suivre le MOOC "Des rivières et des hommes" sur Twitter : @MOOC_RdH.

Piloté par Grenoble INP et sous la coordination scientifique de l'Institut de Recherche pour le Développement, le MOOC est réalisé et animé en collaboration avec l'École normale supérieure de Lyon, l'Université catholique de Louvain, l'Institut polytechnique de l'Université nationale du Vietnam à Hô-Chi-Minh-Ville et l'Université Lumière Lyon 2, dans le cadre du Réseau d'Excellence des Sciences de l'Ingénieur de la Francophonie (RESCIF). Il est diffusé sur la plateforme FUN (France Université Numérique).

Dans le cadre de RESCIF

PFIEV in Ho Chi Minh University of Technology : a new topic dedicated to water issues

UNIVERSITÉ NATIONALE DE HOCHIMINH VILLE
INSTITUT POLYTECHNIQUE

RÉPUBLIQUE SOCIALISTE DU VIETNAM
Indépendance – Liberté – Bonheur

Hochiminh ville, le 04 février 2018

No : ...351.../ĐHBK-PFIEV
Objet: proposition d'ouverture de l'option Technique et Gestion de l'eau urbaine dans le cadre du PFIEV

A l'attention de : **- Grenoble-INP**
- Consortium PFIEV

Suite à la proposition de Monsieur Julien Némery, enseignant-chercheur de Grenoble-INP et Assoc. Prof. Nguyễn Phước Dân, Doyen de la Faculté de l'Environnement et Directeur du CARE, l'Institut Polytechnique – Université Nationale de Hochiminh ville a le plaisir de transmettre à l'Institut Polytechnique de Grenoble et le Consortium français notre proposition d'ouverture de l'option Technique et Gestion de l'Eau urbaine dans le cadre du PFIEV pour des raisons suivantes:

Pour les besoins sociaux, Ho Chi Minh-Ville avec une superficie totale de 2.095,06 km^2, est la première ville économique et peuplée du Vietnam. Sa population réelle en 2017 est d'environ 14 millions, Hochiminh ville contribue à 21,3% de PIB national et à 29,38% du budget total du pays. Pourtant l'infrastructure ne correspond pas à la hauteur de la forte densité de population. Ho Chi Minh-Ville est confrontée à de nombreux problèmes, y compris la pollution de l'environnement, de l'eau, de l'air , des déchets et l'inondation.

Par conséquent, ces problèmes nous conduisent à un vrai besoin de ressources humaines ayant une connaissance intégrée de l'environnement et de la planification de l'eau urbaine qui peuvent répondre aux problèmes environnementaux actuels en particulier des problèmes de l'eau dans le but de trouver des solutions globale initiale dès la conception et la planification afin d'obtenir des milieux urbains propres.

En termes de perspectives de carrière, après l'obtention du diplôme, les ingénieurs en technique et gestion de l'eau en milieu urbain peuvent travailler dans des cabinets de conseil nationaux et internationaux sur l'approvisionnement en eau et le drainage urbain et industriel, le traitement de l'eau, des eaux usées, des déchets et des gaz rejetés; dans des entreprises du domaine des équipements de surveillance de la pollution. Ils peuvent également travailler dans des centres / instituts de recherche ou enseigner dans les universités et les IUT. De plus, grâce aux connaissances en gestion, les ingénieurs peuvent travailler aussi dans les organismes gouvernementaux tels que le Département de la Construction, le Département des Ressources naturelles dans les provinces, des services de gestion urbaine dans des arrondissements.

En ce qui concerne de ressources humaines et d'équipements, l'Insitut Polytechnique dispose actuellement d'une Faculté de Génie Civil et d'une Faculté de l'Environnement avec des enseignants qualifiés. Les laboratoires de notre école et, en particulier, le laboratoire CARE, sont prêts à soutenir des formations d'ingénieurs en Technique et Gestion de l'eau urbaine à l'envergure internationale.

Quant à notre Programme de Formation d'Ingénieur d'Excellence au Vietnam (PFIEV Hochiminh), adopté par l'IP HCM depuis 1999 et avec le soutien fort des grandes écoles d'ingénieurs françaises, nous sommes responsables de 7 spécialités dont le Bâtiment et Énergie fait partie en partenariat avec l'INSA Lyon. Basé sur l'intention initiale de former des ingénieurs avec une connaissance interdisciplinaire de la construction et de l'environnement, ayant une base scientifique solide, capable de mettre en place des solutions globales, nous sommes persuadés que l'ouverture de cette formation dans le cadre du PFIEV sera très approprié. En tant que membre du RESCIF et en coopération très étroite avec Laboratoire Care, nous souhaitons que Grenoble INP soit notre partenaire de cette nouvelle option, comme vous étiez déjà avec nous en Mécatronique depuis 1999.

Pour toutes les analyses citées ci-dessus, l'Institut Polytechnique- Université nationale de Hochiminh ville voudrait s'adresser à l'Institut Polytechnique de Grenoble et au Consortium français la proposition initiale concernant l'étude d'ouverte de l'option Technique et Gestion de l'Eau urbaine dans le cadre de PFIEV.

Pour préparer la présentation officielle du projet avec un dossier complet, l'Institut Polytechnique - Université Nationale de Hochiminh ville aimerait nommer deux professeurs, Assoc. Prof. Dr. Nguyen Thong, Chef du Département de l'Ingénierie des Ressources en Eau - Faculté de Génie Civil et Assoc. Prof. Dr. Bui Xuan Thanh, Chef du Département des Sciences et Technologies de l'Environnement, Faculté de l'Environnement et des Ressources, comme coordinateurs vietnamiens pour travailler sur l'orientation et le programme de formation.

Au nom de l'Institut Polytechnique de Hochiminh ville, je voudrais adresser tous mes sincères remerciements à Grenoble INP et au Consortium français pour vos soutiens permanents à la formation, la recherche scientifique et l'échange d'enseignants et d'étudiants de notre Institut et j'espère que dans un proche avenir, l'option Technique et Gestion de l'Eau Urbaine deviendra une réalité au PFIEV.

POUR LE RECTEUR
VICE-RECTEUR

TRƯỜNG ĐẠI HỌC BÁCH KHOA

Assoc. Prof. Dr. TRẦN THIÊN PHÚC

Copie:

- Idem ci-dessus;
- Service administratif, PFIEV

Grenoble, le 27 juin 2018

Objet : lettre de soutien au laboratoire Care dans le cadre de l'obtention d'un label LMI

L'école Grenoble INP Ense3 forme dans ingénieurs dans les domaines de l'énergie, l'eau et l'environnement. Elle comprend 1200 étudiants dont plus de 25% d'étudiants étrangers.
Elle cherche à renforcer son développement international, sur l'ensemble des thématiques cœur de formation : les smart grid, la mécanique des fluides, les ouvrages de génie civil pour l'hydraulique et enfin l'hydrologie.

C'est dans ce cadre que nous avons soutenu le laboratoire CARE, avec ces dernières années, des échanges d'étudiants, le montage de projets de recherche internationaux et l'envoi sur place d'un enseignant chercheur pendant un an dans le cadre d'un CRCT suivi d'une délégation IRD. Cela a permis de construire une offre de formation conjointe dans le cadre du PFIEV, intitulée « Water infrastructures in urban areas », à Ho Chi Minh UT. Cette formation de 2 ans est centrée sur les enjeux de traitement de l'eau, de pollution des sols et d'hydrologie, enjeux cruciaux pour cette région du monde. Cette formation, qui est co-construite avec nos partenaires sur place, va permettre d'intensifier les échanges d'étudiants de master qui pourront poursuivre en thèse dans la cadre du CARE.

Avec ces actions, Grenoble INP prolonge les partenariats forts et historiques avec le Vietnam, qu'il a initié dans les années 1960. Ces collaborations se sont développées intensément avec les trois Instituts Polytechniques de Danang, Hanoi et Ho Chi Minh-Ville (HCMUT) et ont abouti à un partenariat exemplaire alliant formation, recherche et valorisation. 280 enseignants-chercheurs vietnamiens ont ainsi été formés à Grenoble en 40 ans et 18 étudiants vietnamiens sont en cours de thèse.

La labellisation LMI du laboratoire CARE serait évidemment un atout clef pour permettre l'échange dans de bonnes conditions d'étudiants français et vietnamiens dans le cadre de projets de recherche conjoints avec HCMUT.

Pour l'ensemble de ces raisons, Grenoble INP – Ense3 soutien très fortement la demande portée par l'IGE de labélisation par l'IRD du laboratoire CARE en LMI.

École nationale Supérieure de l'Energie, l'Eau et l'Environnement

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Appendix 12 : list of monthly activity and annual report for RESCIF (period 2017 to 2018)

CARE'S ACTIVITIES
(JUNE 2018)

1. STUDENT/EXPERT EXCHANGE

TIME	AFFILIATION	EXCHANGE INSTITUTION	NAME	PROJECT
04/06/2018 – 28/08/2018	Université de Poitiers	CARE	Léa Guyomarc'h	Cooperation Algae-bacteria to treat wastewater.
06/06/2018 – 20/08/2018	Polytech Montpellier	CARE	Ranchon Jean-Baptiste	Co-digestion with municipal biowaste and water waste using anaerobic membrane bioreactor.
12/06/2018 – 13/08/2018	Polytech Montpellier	CARE	Florrent Rossoni	Development of a drinking water using human power for emergency situation.
15/06/2018 -13/09/2018	Grenoble-INP	CARE	Hugo Munier	Hydrology, salinisation and induced conflicts on water resources.
20/06/2018 – 20/08/2016	Grenoble-INP	CARE	Axel Valere	Using the the Telemac model to study the effects of coastal protection (mangrove forest) in Vietnam.
15/06/2018 – 31/07/2018	University of Nantes	CARE	Quentin Cau	Projet WANASEA (networking in Vietnam)
22/06/2018 – 21/08/2018	University of Toulouse capitole	CARE	Chanleakhena Taing	Projet WANASEA (networking in Vietnam)

2. TRAINING COURSE

TIME	LECTURER	COURSE

3. EVENT

- 04/06 **- 11/06** **- 12/06** **- 18/06** **- 19/06** **- 21/06** **- 25/06** **- 29/06**	**- "CountdownPlastic event" at Hanoï** **- Seminar of Alice Peyne, Paris 7** **- Vistit 1001 Fontaines – R.Joly** **- Seminar WARM** **- Visit University Chung Yuang** **- J.P Rousse Rector** **- Welcome Sara Tweed** **- IJL Lab CARE submission**

CARE'S ACTIVITIES
(MAY 2018)

1. STUDENT/EXPERT EXCHANGE

TIME	AFFILIATION	EXCHANGE INSTITUTION	NAME	PROJECT
02/05/2018 – 27/07/2018	ENGEES	CARE	Marie FOCH	Étudier le drainage urbain de l'eau à Ho Chi Minh ville en raison de pluies exceptionnelles en appliquant le modèle numérique 1D + 2D.
02/05/2018 – 28/07/2018	ENGEES	CARE	Louise BUSI	Ecotoxicology: impact of pollutants on aquatic organism.
30/04/2018 – 28/08/2018	ENSCR	CARE	Constance ARNAUD	Tannery waste water treatment by membrane bioreactor system.
21/05/2018 -25/05/2018	CNRS	CARE	Filipe Aires	Cooperate
25/05/2018 – 17/08/2016	The university of Limoges	CARE	Julia PEROLLA	Elimination of organic molecules and nutrients by bioreactors with membrane during the treatment of salt WW
25/05/2018 – 17/08/2018	The university of Limoges	CARE	Lisa BARRUCAN	The use of green roofs for the treatment of domestic WW
25/05/2018 – 17/08/2018	The university of Limoges	CARE	Pauline FLOBINUS	The use of green roofs for the treatment of domestic WW

2. TRAINING COURSE

TIME	LECTURER	COURSE

3. EVENT

- 3/05 - 4/05 - 8-11/05 - 17/05 - 18/05 - 22/05	- Seminar Nanotechnology – Prof. Heechul Choi (GIST), South Korea - Meeting with St Gobain Compagnie - Seminar Vincent Couchevelou and Wendling Margot - EPFL - Conference/ Exposition Plastic at Quy Nhon - Projet WANASEA – RMIT - Seminar Le Nguyen H.Nam - HCMUT - Seminar Rémi Petit – Paris 7

CARE'S ACTIVITIES
(APRIL 2018)

1. STUDENT/STAFF EXCHANGE

TIME	AFFILIATION	EXCHANGE INSTITUTION	NAME	PROJECT
01/04/2018 – 31/08/2018	Grenoble INP	CARE	Roman SMOLIAKOV	Water discharge and salinity in the Saigon river Dr. Nicolas Gratiot & Dr. Ho Tuan Duc
April – June 2018	Agro ParisTech	CARE	Athena HICKS	Some green solutions for a better treatment of water challenges in the megacity of Ho Chi Minh city. Dr. Nicolas Gratiot
23/04/2018 - 2018	University of Tours	CARE	Dang Du Phuc Tho	Caractérisation des microplastiques dans les sédiments de surface urbaine. Dr. Émilie STRADY & Dr. Kieu Le Thuy Chung

2. TRAINING COURSE

TIME	LECTURER	COURSE
16/04/2018 – 21/04/2018	Marc Descloitres	- Name: Hydro-Geophysics training school 2018 - Time: April 16th – April 21st, 2018 - Number of student: 20 - Location: CARE Lab - Program: Theory (16, 17 and 18/04); Fieldwork (19 and 20/04); Certificate presentation ceremony (21/04)

3. EVENT

- 02/04/2018 – 03/04/2018 - 2/4 /2018	- Visit Line Dubé, Polytechnique Montréal - Meeting with companies in French Consulate

CARE'S ACTIVITIES

(FEB AND MAR 2018)

1. STUDENT/STAFF EXCHANGE

TIME	AFFILIATION	EXCHANGE INSTITUTION	NAME	PROJECT
26/2/2018 – 4/5/2018	EPFL	CARE	Wendling Margot	Development of anaerobic MBR technology in Tannery wastewater treatment. Prof. Bui Xuan Thanh
18/03/2018 – 26/03/2018	LEESU	CARE	Soline ALLIGANT	PhD student from LEESU Émilie STRADY Thuy Chung KIEU LE
01/03/2018 – 5/06/2018	EPFL (Swiss Federal Institute of Technology)	CARE	Lena BONIN	N.Gratiot Water drop local staff
5/2/2018 – 18/5/2018	Université Paris Diderot - Paris 7	CARE	Alice PEYNE	N.Gratiot
26/2/2018 – 27/4/2018	Université Paris Diderot - Paris 7	CARE	Rémi PETIT	Trang Ngo, Unv. S.Sociale N.Gratiot CARE IMPACT OF BA LAI DAM ON SOCIAL ECONOMIC DEVELOPMENT IN BEN TRE PROVINCE
18/12/2017 – 25/3/2018	EPFL	CARE	Alexandre Marcos	Nutrient recovery by membrane photobioreactor and algae biomass production Dr. Bui Xuan Thanh

2. TRAINING COURSE

TIME	LECTURER	COURSE
n/a	**n/a**	**n/a**

3. EVENT

- 03/01	- Visit A.Drogoul
- 15/01	- Visit J.Pierre Prof ESFL
- 19/01	- Visit consulate
- 24/01-26/01	- LMDCZ final workshop/SWIRR
- 23/02	- Visit M.Desniet Univ. Tours
- 08/03	- Seminar Subsidence de C.Grall
- 26/03-31/03	- Visit J.Nemery PFIEV
- 27/3	- Seminar Doan Thuy Kim Phuong – Da nang Uni
- 30/03-03/04	- Visit L.Dube Polytech

(DECEMBER 2017)

1. STUDENT/STAFF EXCHANGE

TIME	AFFILIATION	EXCHANGE INSTITUTION	NAME	PROJECT
13/10/2017 – 13/12/2017	LEGOS	CARE	Rachid Benshila	"Developing 3D coastal ocean models for the Vietnam coast" with P. Marchesiello (MLD/IRD)
25/9/2017 – 31/12/2017	HCMUT	CARE	Tran Nguyen Thien Tam	Modeling of transport in porous media Dr. Tran Ngoc Tien Dung
25/9/2017 – 31/12/2017	HCMUT	CARE	Le Nguyen Hai Nam	Modeling of transport in porous media Dr. Tran Ngoc Tien Dung
18/9/2017 – 15/12/2017	EPFL	CARE	Aude Sagnimorte	"Direct contact membrane distillation for saline water treatment " with Pr. Bui Xuan Thanh
18/12/2017 – 25/03/2018	EPFL	CARE	Alexandre Marcos	Nutrient recovery by membrane photobioreactor and algae biomass production Dr. Bui Xuan Thanh
18/9/2017 – 18/03/2018	Grenoble INP-ENSE3	CARE	Alan Herledan	"Simulation of erosion of Hoi An beach and propose solution. Effect of mangrove in Can Gio on the sediment transport and dissipating the energy of wave" with Assoc. Prof. Dr. NGUYEN Thong
4/9/2017 – 31/4/2018	HCMUT	CARE	Le Minh Tam Cao	Master 2 student "The current situation and propose solutions are assessed to raise awareness of the flooding in Ho Chi Minh's community" with Dr. Tien Dung TRAN NGOC

2.TRAINING COURSE

TIME	LECTURER	COURSE
n/a	**n/a**	**n/a**

3. EVENT

- 12/12/17 - 14/12/2017 - 19/12/2017	- Visit of Science Counselor of French embassy - Visit of M. Alexis Drogoul – Director of IRD - Seminar: "Applied remote sensing to monitor the hydro system of Saigon Dongnai and Mekong river" conducted by Nicolas Gratiot, Patrick M., San Ha.

CARE'S ACTIVITIES
(SEPTEMBER-OCTOBER 2017)

1. STUDENT/STAFF EXCHANGE

TIME	AFFILIATION	EXCHANGE INSTITUTION	NAME	PROJECT

13/10/2017 – 13/12/2017	LEGOS	CARE	Rachid Benshila	"developing 3D coastal ocean models for the Vietnam coast" with P. Marchesiello (MLD/IRD)
25/12/2017 – 31/12/2017	HCMUT	CARE	Tran Nguyen Thien Tam	Modeling of transport in porous media Dr. Tran Ngoc Tien Dung
25/12/2017 – 31/12/2017	HCMUT	CARE	Le Nguyen Hai Nam	Modeling of transport in porous media Dr. Tran Ngoc Tien Dung
18/9/2017 – 15/12/2017	EPFL	CARE	Aude Sagnimorte	"Direct contact membrane distillation for saline water treatment" with Pr. Bui Xuan Thanh
18/9/2017 – 24/11/2017	EPFL	CARE	Mégane Vogel	EPFL, End of Bachelor "Experiment and solute transport modeling in unsaturated double-porosity media" with Dr. TRAN NGOC Tien Dung
18/9/2017 – 18/3/2018	Grenoble INP-ENSE3	CARE	Alan Herledan	"Simulation of erosion of Hoi An beach and propose solution. Effect of mangrove in Can Gio on the sediment transport and dissipating the energy of wave" with Assoc. Prof. Dr. NGUYEN Thong
4/9/2017 – 31/04/2018	HCMUT	CARE	Le Minh Tam Cao	Master 2 student "The current situation and propose solutions are assessed to raise awareness of the flooding in Ho Chi Minh's community" with Dr. Tien Dung TRAN NGOC
4/9/2017 – 31/12/2017	Myongji University (MJU) South Korea	CARE	Jahng, Deokjin	Sabbatical leave from MJU Appropriate technologies for wastewater treatment in tropical regions with Prof Bui Xuan Thanh

2. TRAINING COURSE

TIME	LECTURER	COURSE
n/a	**n/a**	**n/a**

3. EVENT

- 16,17/10/2017 - 18-20/10/2017	- Restitution projet saigon river - Rescif meeting

CARE'S ACTIVITIES
(JUNE 2017)

1. STUDENT/STAFF EXCHANGE

TIME	AFFILIATION	EXCHANGE INSTITUTION	NAME	PROJECT

11/6/2017 – 1/9/2017	Grenoble INP-Ense3	CARE	GONIN Manon	Etude du couplage socio-hydrologique des inondations urbaines d'Ho Chi Minh - Ville vers une solution de la prévision des inondations With Dr. Tien Dung TRAN NGOC
11/6/2017 – 1/9/2017	Grenoble INP-Ense3	CARE	VEDRINE Simon	Experiment and solute transport modeling in unsaturated double-porosity media. With Tien Dung TRAN

2. TRAINING COURSE

TIME	LECTURER	COURSE
12-16/6/2017	EMILIE STRADY JULIEN NEMERY	Water quality: from sampling to interpretation

3. EVENT

n/a	**n/a**

CARE'S ACTIVITIES
(MAY 2017)

1. STUDENT/STAFF EXCHANGE

TIME	AFFILIATION	EXCHANGE INSTITUTION	NAME	PROJECT
22/5/2017 – 18/8/2017	ENSIL-ENSCI	CARE	FONTAINE Tony	Effect of Antibiotics dosage on the performance of sponge membrane bioreactor treating hospital wastewater Avec Bui Xuan Thanh
22/5/2017 – 18/5/2017	ENSIL-ENSCI	CARE	FARKHANI YARISS	Effect of Antibiotics dosage on the performance of sponge membrane bioreactor treating hospital wastewater Avec Bui Xuan Thanh
22/5/2017 – 18/5/2017	ENSIL-ENSCI	CARE	DADOU Hugo	Membrane Photobioreactor Avec Bui Xuan Thanh
22/5/2017 – 18/5/2017	ENSIL-ENSCI	CARE	ESILVA PINHO NICOLAS	Struvite $MgNH_4PO_4.6H_2O$ Avec Bui Xuan Thanh

2. TRAINING COURSE

TIME	LECTURER	COURSE
n/a	**n/a**	**n/a**

3. EVENT

- 16/5- 20/5/2017	- ISEAC 5: The 5th international symposium on environmental analytical chemistry (ISEAC 5 - Asia). Ho Chi Minh city, Vietnam (2017)

CARE'S ACTIVITIES
(JAN, FEV, MARS 2017)

1. STUDENT/STAFF EXCHANGE

TIME	AFFILIATION	EXCHANGE INSTITUTION	NAME	PROJECT
1/2 – 10/3/2017	EPFL	CARE	Sarah Ancel	Récupération des nutriments de l'urine pour la production de struvite
8/2 – 1/3/2017	MNHN Paris	CARE	Frank David	Impact des activités humaines sur le réseau trophique de la mangrove de Can Gio
8/2 – 8/3/2017	MNHN Paris	CARE	Baptiste Vivier	Devenir des effluents de la crevette dans un estuaire de mangrove : analyse des acides gras et des nutriments
2/2016 – 9/2017	HCMUT	CARE	Lam Nhat Khanh	Étude des caractéristiques sur l'inondation de HCM ville
5/2/2017 – 16/4/2017	Grenoble INP	CARE	Lucas Barbieux	Propriétés des sédiments dans les rivières SG-DN et Mekong
27/12/2016 – 17/03/2017	HCM USSH	CARE	Tran Ngoc Thuy	Étude des caractéristiques sur l'inondation de HCM ville
01/2017 – 07/2017	HCMUT	CARE	Nguyen Ngoc Tam Thi	Recherche sur la transformation particulaire du phosphore sous la marée dans la rivière de Saigon
02/2017 – 12/2017	HCMUT	CARE	Truong Ngoc Viet	Bisphénol A et HAP (hydrocarbure aromatique polycyclique).
02/2017 – 12/2018	HCMUT	CARE	Nguyen Van Thoai	Micro-plastique

2. TRAINING COURSE

TIME	LECTURER	COURSE
n/a	**n/a**	**n/a**

3. EVENT

- 10/2/2017 - 16/2/2017 - 23/3/2017	- Visit of Marc Desmet, project COOPERA-CMIRA. - Seminar « Modélisation des évolutions à long terme de traite de côté » conducted by TRAN Hai Yen, Doctorante, LEGI Lab, Grenoble INP. - Seminar « Impact des activités humaines sur le réseau trophique de la mangrove de Can Gio: traçage à l'aide d'outils moléculaires et conséquences sur les flux de carbone », conducted by DAVID Frank, doctorant, Museum National d'Histoire Naturelle, France. - Seminar « Surveillance côtière par vidéo: passage de la plateforme terrestre aux plates-formes drones », conducted by DUONG Hai Thuan, doctorant, LEGOS Lab, Université de Toulouse. - Visit of director of IRD M. Jean Pascal, Dr. Alexis Drogoul and M. Emmanuel Ly-Batallan.