Topics covered *by the research teams*

(January 2012)

The different research units and teams appearing in this document are listed in the table below.

1. The resource: identification, functioning, mobilisation
2. Conservation and restoration of water quality
3. Management of water resource and uses: institutions, territories and societies

Each team's "main" topics are indicated in (•) in the table below.

Page: research unit presentation

Units	page	1	2	3
UMR ART-Dev – Actors, Resources and Territories in the Development Process (CNRS, UM3, CIRAD, UM1, UPVD) **Genevieve Cortès**	48			•
UMR EMMAH – Mediterranean Environment and Agro-Hydrosystems Modelling (INRA, UAPV) **Liliana Di Pietro**	14	•	•	
UMR ESPACE-DEV – Spatial Analysis for Development (IRD, UM2, UAG, UR) **Frédéric Huynh**	47	•		•
UMR G-EAU – Water Management, Stakeholders, Uses (AgroParisTech, IRSTEA, CIHEAM-IAMM, CIRAD, IRD, Montpellier SupAgro) **Patrice Garin**	40	•	•	•
UMR GM – Montpellier Geosciences (CNRS, UM2) **Jean-Louis Bodinier**	10	•		
UMR GRED – Governance, Risk, Environment, Development (IRD, UM3) **Francis Laloë**	42			•
UMR HSM – Montpellier HydroSciences (CNRS, IRD, UM1, UM2) **Éric Servat**	8	•	•	•
UMR IEM – European Membrane Institute (CNRS, ENSCM, UM2) **Philippe Miele**	26		•	
UMR ITAP – Information-Technology-Environmental Analysis-Agricultural Practices (IRSTEA, Montpellier SupAgro) **Tewfik Sari**	28	•	•	•
UMR LAMETA – Montpellier Laboratory of Theoretical and Applied Economics (CNRS, INRA, Montpellier SupAgro, UM1) **Jean-Michel Salles**	44			•
UMR LISAH – Laboratory for the study of Interactions between Soils, Agrosystems and Hydrosystems (INRA, IRD, Montpellier SupAgro) **Jérôme Molénat**	13	•	•	•
UMR TETIS – Territories, Environment, Remote Sensing and Spatial Information (AgroParisTech, CIRAD, IRSTEA) **Jean-Philippe Tonneau**	46	•	•	•
UMS OREME – Mediterranean Environmental Research Observatory (CNRS, IRD, UM2) **Nicolas Arnaud**	13	•		
UPR GREEN – Management of Natural Resources and the Environment (CIRAD) **Martine Antona**	49			•
UPR EAU/NRE – Water: New Resources and Economics (BRGM) **Jean-Christophe Maréchal**	16	•		•
UPR LBE – Environmental Biotechnology Laboratory (INRA) **Jean-Philippe Steyer**	29		•	
UPR LGEI – Industrial Environment Engineering Laboratory (EMA) **Miguel Lopez-Ferber**	12	•	•	•
US Analysis – Water, Soils and Plants Analyses (CIRAD) **Daniel Babre**	31		•	

Agropolis International training and education

in the field of "Water"

Agropolis International, through its affiliated institutions, universities and engineering schools (and specialised vocational training institutes) offers a complete range of training programmes, with over 80 degree programmes (from the baccalaureate – high school leaving certificate – 2-years post-secondary to 8-years post-secondary: technician, engineer, bachelor's degree (licence), master's, specialised master's, PhD, etc.).

The tables below outline the training-education courses related to "Water". They specify the diploma levels, the title of the training and the institutions where it is delivered.

Programmes entirely focused on the theme of "Water"

Level	Degree	Title	Institutions
Bac +3 (3-years post-secondary)	***Licence* (BSc)**	Life and Earth Sciences - Earth and Water focus	UAPV
	***Licence professionnelle* (BSc with professional scope)**	Automated Management of Water Treatment Systems	UM2, Montpellier SupAgro, EPLEFPA (Lozère)
Bac +5 (5-years post-secondary)	***Master* (MSc)**	Water – "Water and Society" Speciality	AgroParisTech, IAMM, Montpellier SupAgro, UM1, UM2, UM3
		Water – "Water and Agriculture" Speciality	AgroParisTech, Montpellier SupAgro, UM2
		Water – "Water and Resources" Speciality	UM2
		Water – "Contaminants, Water and Health" Speciality	UM1, UM2
		Hydrogeology, Soils and Environment	UAPV
	***Ingénieur* (Engineering degree)**	Agronomy Engineer - Option "Management of Water, Cultivated Lands and the Environment"	Montpellier SupAgro
		Polytechnic Engineer - Water Sciences and Technologies	UM2
Bac +6 (6-years post-secondary)	***Mastère spécialisé* (Specialised MSc)**	Water Management	AgroParisTech
		Water for All	AgroParisTech

Programmes focused on other themes having a water component

Level	Degree	Title	Institutions
Bac +2 (2-years post-secondary)	***DUT (University diploma of technology)***	Biological Engineering, Option Environmental Engineering	UPVD
		Chemistry: Chemical Analysis Applied to the Environment	UM2
Bac +3 (3-years post-secondary)	***Licence* (BSc)**	Geography	UM3
		Biology	UNîmes
		Geosciences, Biology, Environment	UM2
		Earth & Environmental Sciences	UPVD
		Biology, Ecology	UPVD
	***Licence professionnelle* (BSc with professional scope)**	Sustainable Management and Planning of Territories and Resources	UPVD
		Chemical Analysis Applied to the Environment	UM2
		Environmental Impacts and Risks Professions	UNîmes
		Dismantling, Waste and Depollution, Control of Industrial Risks Professions	UNîmes

...programmes focused on other themes having a water component

Level	Degree	Title	Institutions
Bac +5 (5-years post-secondary)	***Master*** **(MSc)**	Engineering and Territorial Management	UM1, UM2, UM3
		Rural Societies, Territories and Natural Resource Management in the Mediterranean	IAMM
		Agricultural Management and Territories	IAMM, UM3
		ICTS for the Environment	UM2
		Territories and Societies, Planning and Development	UM3
		Sustainable Development and Planning	UM3
		Geosiences	UM2
		Ecology-Biodiversity, specialities: Biodiversity Evolution, Environment and Sustainable Development	UM2, Montpellier SupAgro
		Marine Geosciences and Aquatic Environments	UPVD
		Water - speciality: Coast and Sea Management	UM3, UM2, UM1
		European Master Sustainable Development in Agriculture (AGRIS MUNDUS)	Montpellier SupAgro, 5 European universities
	Ingénieur **(Engineering degree)**	Risk Management and Environment	EMA
		Engineer in International Agri-Development	ISTOM
		Chemistry and Bioprocessing for Sustainable Development (Green Chemistry – Sustainable Chemistry)	Montpellier SupAgro
		Agronomy Engineer, "Water and Water Engineering" Major	AgroParisTech
		Agri ICT - Information & Communication Technologies	Montpellier SupAgro
		Territories and Resources: Public Policy and Stakeholders	Montpellier SupAgro
Bac +6 (6-years post-secondary)	***Mastère spécialisé*** **(Specialised MSc)**	Industrial Safety and Environment	EMA
Bac +8 (8-years post-secondary)	**Doctorat (PhD)**	Integrated Systems in Biology, Agronomy, Geosciences, Hydrosciences, Environment (ED 477 SIBAGHE)	AgroParisTech, Montpellier SupAgro, UM1, UM2
		Territories, Time, Societies and Development (ED 60 TTSD)	UM3
		Sciences and AgriSciences (ED 536 SAS)	UAPV

Short non-degree programmes

Institution	Title
AgroParisTech	Flood prevention and dynamic flood slowing structures (5 days)
	Hydrosystems: hydromorphology, hydroecology, environmental assessment (4 days)
	Financial instruments to reinforce and develop water and sanitation services (4 days)
	Human resource management in water and sanitation services (4 days)
	Strategic planning for water and sanitation services (12 days)
	Engineering of existing river embankments (5 days)
	Water quality and health (4 days)
	Principles and tools of water and sanitation services management (4 days)
	Greenways and blueways: land use planning tools (4 days)
	Preparation for the negotiation of a public service delegation contract for water or sanitation (4 days)
Montpellier SupAgro	Reuse of waste water for irrigation (21 hours)
UM2	DU Technician specialised in aquaculture
	DU Project and Operations Manager in aquaculture and halieutics

▼*Field experiments with the students of the Water Master.*

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MASTERS' & GRADUATE SCHOOLS
linked to the theme of water

Focus on *some Master's degrees* centred on water

▶"Water" Master: a unique degree with five specialities

Thanks to its unique disciplinary diversity, Montpellier has one of the best research and higher education potentials in Europe in the field of water. The partner institutions in the city (UM1, UM2, UM3, Montpellier SupAgro, AgroParisTech, CIHEAM-IAMM) offer training programmes covering all aspects related to water. For the five specialities proposed in the "Water" Master, the final orientation of the student is chosen in the second year of master according to the type of internship: in a laboratory (research orientation) or in a company/organisation (professional orientation). The five specialities offered are:

- Water and agriculture
- Contaminants, water and health
- Water and society
- Water and coasts
- Water and resource (either HYDRE "Hydrology, Risk, Environment" pathway or H3E "Qualitative and Quantitative Hydrogeology, Environment" pathway).

The main openings after this degree programme lie in the following fields of activity: Water and Environmental Sciences; Regional Management; Public Policy; Consultancy, Mediation, Evaluation; Environmental Law, Insurance; Higher Education / Research; Water Supervision and Analysis; Ecotoxicological and Health Risks; Water Quality department in private or public structures; Agronomy.

Students are selected at the M1 level from applicants with a 3-year university degree or equivalent in different fields (sciences, geography, law, economics, health...). Enrolment in M2 is reserved in priority for students who have successfully completed the M1, then to applicants from other Master programmes, depending on availabilities and on prerequisites. Entry at the M1 or M2 level is also open to employees as part of a vocational training programme. •••

Contacts and addresses

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"Hydrogeology, Soils and Environment" (HSE) Master
(UAPV, UR)
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http://agrosciences.univ-avignon.fr/fr/mini-site/miniagro/master-hydrogeologie-et-environnement.html

"Water for All" Specialised Master (OpT)
(AgroParisTech, Mines-ParisTech)
Manager: Jean-Antoine Faby
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www.agroparistech.fr/International-Executive-Master-OpT,2132.html

"Integrated Systems in Biology, Agronomy, Geosciences, Hydrosciences, Environment" Graduate school (ED 477 SIBAGHE)
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"Territories, Time, Societies and Development" Graduate school (ED 60 TTSD)
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▶"Hydrogeology, Soils, and Environment" Master programme

The Master "Hydrogeology, Soils and Environment" (HSE) is proposed in continuity with the educational programmes delivered at the Avignon University (UAPV) since the early 80s, in water sciences research and engineering. The aim of this Master is to train practitioners able to understand the water resource in its setting (impact of land use change on the resource) and in its relationship with the soil (quantitative and qualitative role of this interface and vulnerability with regard to pollution). To this end, the acquisition of knowledge is focused on three topics:

❶ Functioning of the non-saturated zone;
❷ Functioning of aquifers;
❸ Modelling.

Long-standing relationships with laboratories, research units and companies working in the water and environmental sectors have made it possible to put together a teaching team comprising 40% of the teachers from outside the UAPV: professionals from public water and environmental management organisations, engineering firms or companies specialised in the protection or exploitation of the water resource, as well as researchers from affiliated public bodies. In terms of research, the Master is linked to the EMMAH JRU, that is part of the UAPV "Sciences and Agrisciences" graduate school *(see page 69)*. The HSE Master has both professional and research orientations. The pursuit of a Ph.D. thesis or entrance into the professional world depends on the type of internship chosen (in a research lab or in a professional organisation).

Students are selected at the M1 level after a bachelor's degree in Earth Sciences or Environmental Sciences. They automatically integrate M2 if the M1 is successfully completed. Additional students may be recruited in M2. The second year of the Master is jointly accredited with the La Réunion University (UR). The partners from the UR's Department of Earth Sciences are in charge of specific courses and participate in the supervision of internships.

▶"Water for All" Master: capacity building for future managers

In order to train and build the capacities of future managers of urban water and sanitation services in developing, emerging and transition countries, the "Water for All" chair proposes an international executive master's "Water for All". This training programme (delivered in French and English) offers confirmed professionals in this sector tools, methods and technologies to:

- Drive changes in these services;
- Assess the technical, social and financial sustainability of their services;
- Elaborate strategies to improve them.

This 12-month training programme, delivered by the AgroParisTech centre in Montpellier, is based on an operational partnership with:

- The company that defines the mission of its auditor;
- The auditor that builds the action plan satisfying the defined mission;
- The training team, including professionals, which trains and supports the auditors throughout their mission in Montpellier during the teaching periods and back in their service to carry out their mission.

Moreover, to provide a better understanding of all the operational issues, this cooperative education programme alternates training periods in Montpellier with periods in the auditor's organisation, plus an internship in an equivalent reference service in Europe.

The students are recruited at the 5-year post-graduate level, at the suggestion of their company or supervisory authority.

▲ *The 2010-2011 students of the "Water for All" Master.* © Chaire Eau pour Tous

>GRADUATE SCHOOLS

A doctoral programme lasts three years and involves producing and presenting laboratory research work. All students registering in a doctoral programme are attached to a graduate school. Graduate schools comprise research units or laboratories working on major sets of themes.

Their mission is two-fold: firstly, to ensure direct scientific support to the PhD students, and secondly, to provide additional training, such as seminars, scientific conferences or training modules throughout the 3 years. The aim of these modules is to improve the scientific education of the PhD students and to better prepare their professional future. Three graduate schools are concerned by the theme of water.

Graduate schools linked *to the theme of water*

▶"Integrated Systems in Biology, Agronomy, Geosciences, Hydrosciences, Environment" Graduate School (SIBAGHE, ED477)

The graduate school ED477 SIBAGHE (Integrated Systems in Biology, Agronomy, Geosciences, Hydrosciences, Environment) is part of UM2 in the Life and Earth Sciences section. It has a joint accreditation with Montpellier SupAgro, UM1 and AgroParisTech.

There are roughly 400 PhD students in the SIBAGHE graduate school, which has 40 affiliated research units, 450 approved research supervisors and several associated external research teams. Each PhD student in the SIBAGHE graduate school must successfully complete two scientific training modules and two professional modules. The graduate school manages thesis registrations, ensures PhD student supervision, verifies that the thesis charter is respected, and organises the thesis courses and professional guidance.

In the field of water, the graduate school hosts PhD candidates focusing their theses on the functioning of hydrosystems, water quality, use dynamics and resource and risk management. Both the quantitative and qualitative aspects are examined, sweeping through a large spectrum of disciplines ranging from hydrogeology to microbiology.

▶"Territories, Time, Societies and Development" Graduate school (TTSD, ED60)

The graduate school ED60 TTSD (Territories, Time, Societies and Development) is located at UM3. It encompasses 10 research centres from different institutes in Montpellier: UM3, UM1, Montpellier SupAgro, IRD, and *École Nationale Supérieure d'Architecture de Montpellier* (ENSA). TTSD gathers 65 research supervisors, 280 PhD students of which 32 % are foreigners and offers PhD in 13 fields. Some of the main lines of research are:
- Rural areas, sustainable development, risk prevention and the conservation of natural areas;
- Relationships between societies (human groups, institutions, companies, etc.) and the environment (territories, resources, etc.);
- Physical characteristics and resources (natural or technological) of rural or urban areas, etc.

In the field of water, the graduate school hosts PhD candidates focusing their theses on governance and resource management, access to water and use conflicts, amongst others.

▶"Sciences and Agri-Sciences" Graduate School (SAS, ED536)

The graduate school ED536 SAS (Sciences and Agri-Sciences) encompasses research units in the field of "Sciences, Technology, Health" from the University of Avignon (UAPV) and INRA PACA (Provence-Alpes-Côte d'Azur). SAS thus federates research teams at the local level in complementary fields, linked to biology, physics, chemistry, mathematics, agrisciences, water and computing.

Its research potential is based on 15 recognised research units, gathering 151 teachers and researchers, of which 80 research supervisors. The geographic proximity of the research units making up the graduate school (university and INRA) and its interdisciplinary nature are essential to the school's ambitions.

In the field of water, the graduate school hosts Ph.D. candidates focusing their theses on the functioning of hydrosystems, plant ecophysiology, water quality, etc. ■