

# ENVIRONMENTAL SCIENCES AND ENGINEERING

MASTER





In the environmental field, our planet is facing major challenges: climate change, scarcity of resources such as drinking water, pollution, human population growth or loss of biodiversity. Environmental issues are not only diverse, but also increasingly complex. Although inventing appropriate solutions to these issues involves human, economic and social dimensions, taking into account scientific and technical progress is paramount.



Environmental engineers are trained to solve problems at the crossroad between science and society arising from the complex interaction of human beings with their natural environment. Curious by nature, I focused my master in Water, Soil and Ecosystem Engineering which offers core courses on water-related topics coupled with strong technical know-how in Geographic Information Systems (GIS) and their use for spatial analysis and visualization. Led by my interest in societal issues, I chose my Master's Project on the understanding and modeling of transmission of waterborne epidemic diseases (cholera in Bangladesh) realized at the University of Michigan in Ann Arbor, USA. In this project, I applied concepts in hydrology, optimization and modeling together with programming and spatial analysis to produce and explore data, analyze it and communicate my findings. The possible tasks that I would be able to perform include flood risk evaluation, water management and spatial data analysis and representation which all involve modeling and programming. Possible employers are consulting-engineering companies working in the field of water management and flood mitigation, large firms needing specialists in spatial data analysis and of course Swiss or international institutions like the WHO working in diseases prevention.

**Javier  
PEREZ - SAEZ**

*Magali Bassan:  
"I really liked the opportunity given by this Master to do internships and work on concret projects. I had the opportunity to work in Senegal and Togo to develop water supply and sanitation. I also worked on organic waste valorization with biogas in Valais. Since the beginning of my career, I've always been able to combine my interest for water sanitation and helping developing countries."*

*Patrick Astori:  
"The Master's degree in environmental engineering teaches you how to solve concret problems, directly related to real situations/ settings. During my studies, I worked on the water barriers in Venice, on the development of photovoltaics in Valais or on the third correction of the Rhône. All these examples clearly show the broad fields covered by environmental engineers, as well as their utility."*

I hope this glimpse of activities has convinced you of the opportunities offered by the Environmental Engineering curriculum.

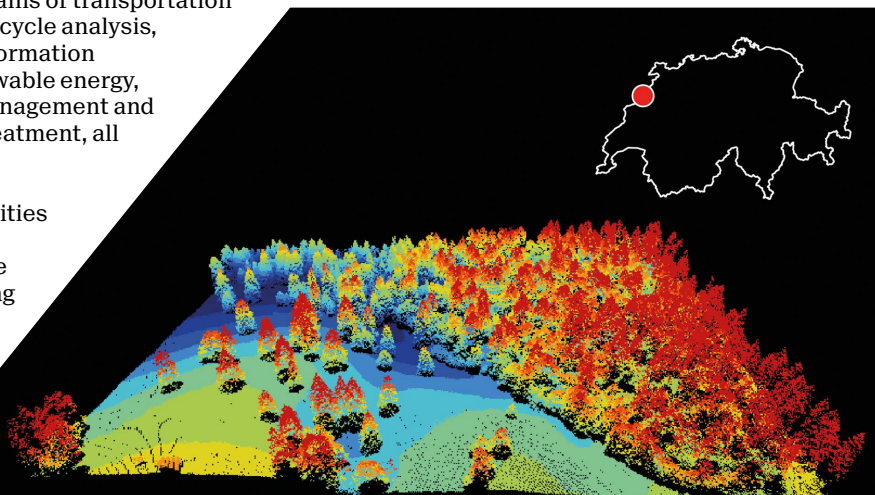
**Matthew PARKAN**

Have you ever wanted to understand why avalanches are so difficult to predict?  
How observing ants can help in network routing?  
How PET bottles can be used to disinfect water?  
Then the Master SIE is made for you!

During my Master in Environmental Modeling and Monitoring, I was able to exercise a diverse set of skills; from planning irrigation networks for arid regions to predicting atmospheric temperatures in Greenland using artificial intelligence. Pretty quickly, geospatial analysis became of special interest to me and I discovered how multidisciplinary it is. Indeed, most environmental studies involve maps and spatial decisions. Questions such as 'Where is the best place to install this wind turbine?' or 'How does the topography of this water catchment influence the risk of flooding?' are a common sight in the problem landscape.

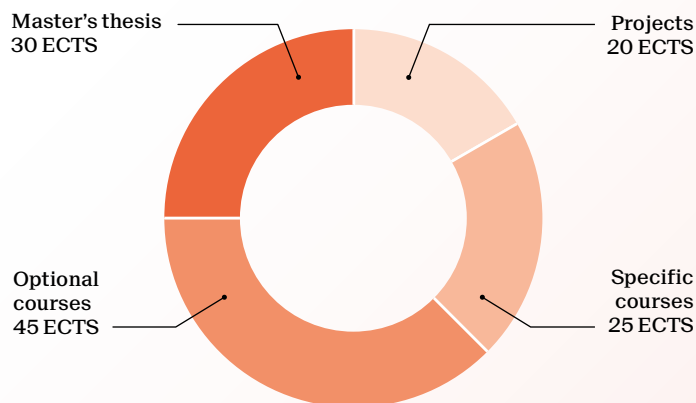
Before my PhD studies, I worked at the Vaud Forest Service to create forest canopy maps and worked in a natural reserve -the Grande Caricaie- to analyze erosion dynamics.

Overall, as an environmental engineer, you will be able to implement both down to earth and high tech solutions. Most of the young environmental engineers work in the domains of transportation systems, life cycle analysis, geographic information consulting, renewable energy, natural reserve management and water/wastewater treatment, all around the world.



# Master of Science in ENVIRONMENTAL SCIENCES AND ENGINEERING

2-year program - 120 ECTS



The program includes an 8-week to 6-month compulsory internship

Students are requested to deepen their training either with a 30 ECTS Specialization in:

- A Chemical and Environmental Bioprocess
- B Water, Soil and Ecosystems Engineering
- C Monitoring and Modeling of the Environment

Students can also opt for a 30 ECTS Minor.  
Minors recommended with this Master:

- Energy
- Integrated Design, Architecture and Sustainability
- Science, Technology and Area Studies - Russia
- Urban Planning and Territorial Development

Other Minors are possible.

A specialization or minor is included in the 45 optional credits.

## Career Opportunities

Your expertise, your newly acquired scientific skills and versatility will allow you to access a wide variety of professional activities in the public or private sector, in industry or the service sector, in Switzerland or abroad. Your prospective employers are primarily design offices, engineering consultants or environmental engineering firms. You also have the opportunity to work in public administration (sanitation, energy, mobility, spatial planning, etc.), in small or large companies or in environmental protection institutions (technical cooperation...). Finally, you may also decide to satisfy your scientific curiosity by embarking on a doctoral thesis.

School of Architecture, Civil and Environmental Engineering  
[master.epfl.ch/environment](http://master.epfl.ch/environment)  
 Contact: [secretariat.ssie@epfl.ch](mailto:secretariat.ssie@epfl.ch)

	Specialization			Credits
<b>Projects</b>				<b>20</b>
Design project				10
SIE/ENAC Project or Summer workshop				4
Project in human and social sciences				6

<b>Specific courses</b>				<b>25</b>
Air pollution and climate change	A			5
Environmental Transport phenomena		B		5
Geomonitoring			C	5
Spatial statistics and analysis			C	5
Water and wastewater treatment	A			5
Water resources engineering		B		5

<b>Optional courses</b>				<b>45</b>
Advanced Satellite Positioning			C	4
Analyse et management des risques industriels	A			3
Applied wastewater engineering	A			3
Biomining: from nature to application	A			4
Bio-ingénierie des cours d'eau et milieux naturels		B		2
Concepts in Ecological Engineering		B		4
Design de SIG			C	4
Development Engineering	A			4
Distributed information systems			C	4
Distributed intelligent systems			C	5
Droit: contrats et responsabilité professionnelle	A	B	C	3
Économie hydraulique		B		2
Éco-morphologie fluviale		B		3
Energy conversion and renewable energy	A			3
Environnements de travail, risques professionnels	A			3
Experimental design and data analysis with R			C	2
Exploratory data analysis and geovisualization		B	C	4
Études d'impact	A	B		3
Fate and behaviour of environmental contaminants	A			4
Fluvial biogeosciences		B		4
Génie des bioprocédés environnementaux	A			5
Gestion foncière et droit foncier			C	3
Groundwater and soil remediation	A			4
Hydraulique fluviale et aménagement de cours d'eau		B		3
Hydrogeophysics		B		3
Hydrologie urbaine		B		4
Image Processing I			C	3
Image processing for Earth observation			C	3
Introduction to database system			C	4
Limnology		B		5
Material and energy flow analysis	A			4
Physics and hydrology of snow		B		4
Recycling of materials	A			2
Risques hydrologiques et aménagements		B		3
Sanitary engineering in developing countries	A			2
Sensor Orientation			C	4
Spatial Decision Support Systems			C	3
Solid waste engineering	A			4
Statistiques multivariées avec R		B	C	4
Sustainability Assessment of urban systems			C	3
Systèmes de management environnementaux	A			2
TP de bioprocédés environnementaux	A			5
Water quality modeling	A	B		4