GENERAL INFORMATION

Program sponsor: Princeton Environmental Institute

Position number: H2LAX

Project title: Mapping Antimicrobial Resistance in the Environment in India

Organization/research group: CDDEP and Swiss Federal Institute of Technology (ETH Zurich)

Primary location(s) of internship: Zurich, Switzerland

Additional cities and/or countries to be visited (if applicable): New Delhi, India

Note: If this internship is located in a country with an International SOS risk rating of High or Extreme, final candidates must participate in a travel review process overseen by the Travel Oversight Group (TOG), and obtain safety guidance prior to departure. The University reserves the right to revoke support and funding for travel at any time there has been a significant deterioration in the safety and security conditions surrounding travel arrangements, or in the sector of the country, or countries, where travel is to occur.

FACULTY SPONSOR(s)/HOST INFORMATION

Name(s): Ramanan Laxminarayan

University Department(s): PEI

E-mail: rlaxmina@princeton.edu

Website:

INTERNSHIP/RESEARCH PROJECT INFORMATION

Internship/project description:
Antimicrobial resistance - the ability of bacteria to withstand the effect of treatment - is a global threat but nowhere is it as stark as in India, which concentrate a large share of the global production of those drugs. In India, the combination of loose environmental standard in the production of antimicrobial have led to their spread of antimicrobial residues in the environment with potentially disastrous consequences for public health. The spread of drugs residues and drug resistant bacteria in natural environment has been document in a number of point prevalence surveys across the country. The objective of the project is the produce the first maps of the trends in antimicrobial resistance due to environmental contaminations in India. Concretely, the student with use geospatial mapping method to map the prevalence of drug-resistant bacteria in natural environment at a resolution of 10 x 10 kilometers. This works builds on a long-standing collaboration between ETH and PEI to map antimicrobial use, and resistance in food animals as well as in humans.

Student's role and responsibilities:

The student will,
- Extract resistance rates for bacteria associated with natural environment in India from the published literature
- Learn basic geospatial mapping technique (calculating variograms, kriging, disease mapping with ensemble methods)

The work is theoretical in nature and the student will benefit from the mentorship of Dr Van Boeckel, and his team at ETH.
**Internship/project learning objectives:**

The student will have the opportunity to learn:

- Methodologies for systematic reviews in medical science, including the PRISMA methodology
- How to handle spatial data and produced map using the open language R
- Perform basic spatial analysis, and statistical test

**PROGRAM REQUIREMENTS**

**Academic background and any course pre-requisites:**

Students should: Be quantitatively minded. Have basic knowledge in microbiology methods. Have basic knowledge of the programming language R Students with prior experience in Matlab/Python can also be considered

**Technical skills:**

Programming language R

**Additional training(s):**

Microbiology desirable but not essential

**Equipment:**

Yes, please bring own laptop

**Physical demands:**

none

**Language abilities/competencies (if applicable):** command of German can be useful for everyday life, but not essential at all

**Additional information about the internship/project:**

Participating students will be required to complete workplace safety training prior to departure/start of the internship. Students will also need to consult UHS for any travel medical requirements/suggestions. If travel to India, visa and/or immunizations may be required.

**INTERNATIONAL TRAVEL REQUIREMENTS (if applicable)**

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<tr>
<th>Visa(s) required?</th>
<th>Research permit/pass required?</th>
<th>Immunizations required?</th>
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<tr>
<td>Yes ○</td>
<td>No ○</td>
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**INTERNSHIP/PROJECT SUPERVISOR(S)**

**Name and title of primary supervisor:** Ramanan Laxminarayan

**Email:** rlaxmina@princeton.edu  
**Phone:** 609-258-7434

**Name and title of additional supervisor, if applicable:** Dr Thomas Van Boeckel

**E-mail:** thomas.vanboeckel@env.ethz.ch  
**Phone:** +41 44 632 64 38

**PROGRAM DATES AND FUNDING INFORMATION**

**Weekly Stipend:** $500 (plus int'l travel award)  
**Number of Positions Available:** 2

**Tentative Start Date (mm/dd/yyyy):** 7/5/2019  
**Number of Weeks:** 8-10

**Tentative End Date (mm/dd/yyyy):** 9/5/2019  
**Note:** PEI funding is for full-time work, 35 hours per week minimum, and for a period of at least 8 continuous weeks.

**Application deadline:** January 11, 2019