

## TEAM PROJECTS

As discussed, this year you have already formed groups of no more than 6 students. If you are not yet assigned to a group, please resolve that ASAP. Now, groups will be assigned a number and project selection will proceed by lottery. This project list is provided so you are prepared to select your top choice from the available projects. In the event that you are **very** unhappy with your project we can discuss alternatives.

### OPTION 1: Team Hidden Stone

**Problem:** Urbanization (cars) and industry (agriculture, factories) generate massive amounts of reactive nitrogen to the atmosphere. This can be deposited to the land and sea via rainfall (wet) and dust (dry). In soils and water this nitrogen can act like fertilizer, stimulating growth of weedy species and reducing biodiversity.

**Question:** How does soil nitrogen and organic carbon chemistry vary across the urban - natural landscape gradient? (optional: what plant and/or invertebrate species are present?). **NEW:How does soil chemistry vary in agricultural areas / roof gardens?**

**Hypothesis:** Due to atmospheric deposition from cars) and a lack of organic matter in urban soils, inorganic nitrogen content will be higher in urban vs. natural soils. Plant/invertebrate diversity will be lower in soils containing higher nitrogen concentrations.

**Methods:** soil chemistry, species identification, stable isotope analysis

### OPTION 2: Team Hidden Leaf

**\*\*HOT - INTERESTING RESULTS IN 2014!!\*\***

**Problem:** Combustion of fossil fuels from industry and automobiles generates elevated levels of ozone (O<sub>3</sub>). Although we like ozone in the upper atmosphere (it shields us from damaging ultraviolet radiation from the sun), ground-level ozone from human activities is a threat to human and environmental health, particularly in urban environments. Specifically, ozone can interfere with plant photosynthesis and limit recovery from leaf damage by predators.

**Questions:** 1) How does leaf recovery from damage vary across an environmental gradient, from urban to natural? 2) How does photosynthesis respond to elevated ozone?

**Hypothesis:** Leaf recovery will be reduced in urban habitats, relative to natural habitats at higher elevation. Photosynthetic efficiency will be negatively affected by increased concentrations of atmospheric ozone.

**Methods:** leaf collection, species identification, fluorometry

**OPTION 3:**  **Team Hidden Tides** **\*\*NEW FOR 2015\*\***

**Problem:** Hong Kong has spent vast amounts of money to improve sewage and wastewater management, including the internationally acclaimed Harbour Area Treatment Scheme. Yet, EPD now receives unprecedented numbers of complaints about the water quality of Victoria Harbour from the public. They have identified that other point and non-point pollutants continue to affect water quality. One such source is stormwater.

**Questions:** What is the quality of stormwater in Hong Kong? How does it vary over spatial scales, from district to district? How does land-use/zoning impact stormwater quality?

**Hypothesis:** Stormwater quality will be poor, owing to high levels of roadside pollutants and urban waste from domestic and commercial sources (particularly restaurants and wet markets).

**Methods:** water sampling, membrane filtration, microbial assays, organic content analysis, BOD

**OPTION 4:**  **Team Hidden Mist**

**Problem:** Urbanization (cars) and industry (agriculture, factories) generate massive amounts of reactive nitrogen to the atmosphere. This can be deposited to the land and sea via rainfall (wet) and dust (dry). In soils and water this nitrogen can act like fertilizer, stimulating growth of weedy species and reducing biodiversity.

**Question:** How does atmospheric deposition of nitrogen vary across the urban - natural landscape of Hong Kong Island? Are there different sources of gaseous or particulate nitrogen across this gradient?

**Hypothesis:** Deposition of nitrogenous oxides will be more pronounced in low-lying areas near congested roadways. Areas of higher elevation, and vegetated areas in country parks will have lower levels of pollutants.

**Methods:** passive and active air sampling, elemental analysis, stable isotope analysis, microbial culturing

**OPTION 5:**  **Team Hidden Sand** **\*\*NEW FOR 2015\*\***

**Problem:** The Shing Mun River is Hong Kong's largest river with the main reach being 16.5 km long. Since the 1980s, the river has had a history of reported problems with its water quality with the most possible causes of pollution being wastewater (industrial, commercial, livestock waste, rural sewerage). Although the HKSAR Government has spent considerable time and effort in restoring the water quality, some problems still persist. Urbanization and development pressure in Shatin has been increasing and the Shing Mun River continues to be at the receiving end of waste from households, industries and restaurants.

**Question:** What is the size of the total nitrogen pool (by nutrient concentration measurements) and dissolved oxygen content in Shing Mun River? What is the impact of anthropogenic activities on the biodiversity and decomposition?

**Methods:** Flow injection analysis, decomposition, DO probe measurements, BOD

**OPTION 6:**  **Team Hidden Clouds** **\*\*NEW FOR 2015\*\***  
w. Dr. L. Gibson

**Problem:** Development of hydropower and associated construction of reservoirs is a major cause of habitat loss and fragmentation, particularly in tropical forests. Besides the actual habitat destroyed by the flooding of forest valleys, reservoirs also create sharp edges between forest and non-forest habitat, which can affect many species living in forest ecosystems.

**Question:** How do reservoirs affect the distribution of mammals? How does the distribution of certain species change across the gradient from the reservoir edge to interior forest?

**Hypothesis:** Large mammals (e.g., Indian muntjac) and carnivores (e.g., masked palm civet) will be less common near reservoirs. Generalist species (e.g., Malayan porcupine, wild boar) will be more common near reservoirs.

**Methods:** transect sampling, camera trapping, species identification, occupancy analysis

**OPTION 7:** 油 Team Myōboku   
w. Dr. C. Dingle

**Problem:** Sound generated from human activities and development is a pollutant in the natural world. Sound pollution can alter the behavior of species, which changes their abundance and distribution in their natural environment. Over time, sound pollution can have detrimental impacts on species and community biodiversity.

**Question:** What is the extent of sound pollution in Hong Kong's Country Parks? How does sound pollution affect the diversity and abundance of resident and/or migratory bird species?

**Hypothesis:** Sound pollution will be higher near urban areas. Resident birds will be more resistant to sound pollution. Migratory birds will avoid areas with high sound pollution.

**Methods:** sound measurements, bird counts, transects & ecological sampling.

**OPTION 8:** 火影 Team Hokage!  **\*\*NEW FOR 2015\*\***  
w. Dr. C. Not

**Problem:** Heavy metals are widely present in the environment (water, soils, biota, etc.). Heavy metals are found naturally in the earth but human activities concentrated them to reach toxic concentration. Industrial wastes, vehicle emissions, fertilizers or plastic floating could be heavy metals sources.

**Question:** What is the concentration of heavy metals in Hong Kong area? Do all area in Hong Kong have the same content of heavy metals? Can we see industry impact on heavy metals concentration?

**Hypothesis:** Anthropogenic activities increase heavy metals concentration

**Methods:** soil and/or sediment chemistry, heavy metals analyses

**NOW THAT YOU HAVE READ THE OPTIONS,  
IT'S TIME TO CHOOSE YOUR DESTINY!**