

SOP – First paragraph based on Problem statement

Sample 1

According to the United Nations, there has been a staggering increase in the number of extreme weather events over the past twenty years, driven largely by rising global temperatures and other climatic changes. During this period, over 7,000 major natural disasters were reported worldwide, killing over 1 million people, and resulting in about \$3 trillion in global economic losses. Moreover, the impact of these events is evidenced in the rapid decrease in populations of certain endangered species such as the Chinook salmon, North American tree swallows, common toad, and the lemurs etc., thereby threatening animal biodiversity and conservation efforts. Specifically, within this time frame, the wild ring-tailed lemurs at the Beza Mahafaly Special Reserve (BMSR), Madagascar have experienced five extreme weather events including severe droughts, extremely high rainfall, and flooding. In addition to population declines due to climate change and direct hunting pressure, this flagship species for conservation also faces significant habitat loss resulting in their reduced survival in the wild. Thus, as a prospective graduate student at the University of XXXXX, it is my interest to identify if gene regulation changes in response to shifting environments and predict the evolutionary responses of this species to climatic change.

Sample 2

Worldwide, the propensity of mosquito vectors to transmit diseases such as dengue fever, filariasis and malaria, continue to represent a serious threat to socio-economic development. The impact of the disease burden is even more pronounced in the tropical regions. Currently, the absence of a protective vaccine, the spread of parasite resistance to therapeutic drugs and mosquito resistance to insecticides are the main obstacles to disease control and elimination. Till date, the use of chemical insecticides makes up most vector control programmes. While being effective, the dramatic increase in mosquito resistance to these chemicals shows that continual usage cannot be further relied upon. From the fore goings, resistance management strategies are very critical, if the efficacy of current practices is to be preserved. This will require a deep understanding of adaptive mechanisms such as behavioural and metabolic resistance. Thus, as a prospective graduate student at the University of XXXX, it is my interest to study the mechanisms of insecticide resistance in mosquito; and consequently, identify the molecular basis (genetic markers) for such mechanisms. Already, I have gained valuable experience in insect studies. My undergraduate research work focused on the “Larvicidal properties of *Datura stramonium* and *Nicotiana tabacum* against Mosquito (Culicine species)”.

Sample 3

Continually, in quest for development, the status of freshwater ecosystems gets altered via contaminants such as metals and other xenobiotics including herbicides and pesticides precipitated by urbanization and land use. Many of these contaminants have been linked to poor development in humans and to diseases including cancer, reproductive and neurogenerative disorders. Yet, researchers have not been able to go beyond circumstantial evidence in establishing causal relationships between pollutants and human diseases because urban pollution effects occur over

many years and experimental evidence is often lacking. The toxic effects of these chemicals have been demonstrated on the fitness of water fleas – crustaceans used to assess water quality in inland water systems. In addition, these chemicals enter the ecological food chain affecting several non-target species including humans. Water fleas being the first target of water pollution are ideal to understand the impact of urbanization and pollution on inland water ecosystems. Thus, as a prospective graduate student at the University of XXXX, it is my interest to study the environmental impacts of urban pollution on the inland water ecosystems using *Daphnia* species as a model organism and the health implications on other taxa including invertebrates and vertebrates. Given their research interests, Professors Andrew Kane and Joseph Bisesi are faculty members that will best support my program if admitted.