Projects

Students and professors in the Environmental Innovators Program take on projects in Asia and Africa to explore new techniques and to train future leaders

Photos courtesy of Matsubara lab

Acadex Elementary School

Building Schoolhouses for the Children of Congo

The Acadex Elementary School Project began in 2008 with the design, construction and operation of an elementary school on the outskirts of Kinshasa, the capital of the Democratic Republic of Congo. Two buildings were erected in the first two years, and a third was completed in 2011.When designing the third building, the form of the roof was a major focus of our efforts. It was created in the shape of a hyperbolic paraboloid in order to ensure efficient drainage of rainwater while also creating a generous interior loft space that the children could use as an elevated reading area.The design was done in Japan with students at Keio University with the intent of building it in partnership with local labor. As it happened the walls were put in place by locals and the roof was built with students from Keio who unexpectedly learned a lesson in flexibility when the design needed to be modified on site to match the actual construction.

Bringing Solar Power to an Energy Poor Area

While building the third schoolhouse, we also installed a solar power generation system on the roof of the first building. Electricity supply in the area is problematic and power outages were an everyday experience for the school, so we brought solar panels from Japan to offer both relief and some degree of independence.It was important that this part of the project did not end with the installation of the new power system; we had to ensure the local community would be able to maintain it and reap its benefits after we left. Accordingly we installed the system with community members in order to transfer our experience and knowledge, and we created a special English manual that included both explanations and drawings of the installation.

http://hasebeken.sfc.keio.ac.jp/congo_acadex/index.html

Photos courtesy of Kobayashi lab

Self-Build Community Center

A Potential Solution to Temporary Housing Issues

Minamisanriku, a town in Miyagi Prefecture, bore the brunt of the Great East Japan Earthquake. While local residents continue to live in the temporary housing provided, there are complaints that the units are hard to live in and are contributing to the breakdown of community ties.We sought to counter this trend through construction of a new community center where local residents can gather and take refuge in each other's company in relative comfort. The project involves a specially developed method for assembling simply cut plywood panels, and was launched with the ideal of affirming community by building a community center together.

Panel-Based Construction Offers Benefits: Self-Build Assembly; Reusability; Local Production & Local Consumption

The panel-based construction method of the community center offers a range of benefits. Most importantly it can be built by members of the community themselves. This ensures that construction costs are kept low, but more importantly the involvement of local residents fosters affinity for the facility within the community itself. In addition, the building can be disassembled and reassembled; plywood panels are highly affordable, lend themselves to easy repair, and minimize the environmental impact of the building. Another important feature for this project is the ability to make use of local production for local consumption. We were lucky to be able to encourage effective use of locally produced wood and advice from local engineers in the construction of the center.Looking to the future, in light of Japan's long-standing tradition of communal bathing, we intend to build a public bath facility within the center in the next phase of the project. Taking a hint from the bathhouses that have long been places of community interaction in Japan, we hope to provide a casual forum for local residents to gather.

http://sfcdb311.wordpress.com

KEIO Environmental Innovators

科学技術戦略推進費 Strategic Funds for the Promotion of Science and Technology

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Photos courtesy of Ichinose lab

Kesennuma Reconstruction Project

Putting Specialist Skills to Use

On March 11, 2011 a 9.0 magnitude earthquake struck the North-East coast of Japan, triggering several large tsunamis and a terrible nuclear accident, and resulting in unprecedented damage in the Tohoku Region of the country. In response more than a hundred professors and students from SFC quickly initiated the SFC3.11 Reconstruction project, part of which was focused on efforts in Kesennuma. Specialists from the fields of tourism, design, history, culture, nursing care, and industry all brought their specialist knowledge and skills to use in order to help bring the affected regions back to their feet. Their efforts are well-documented and purposefully open and transparent, so that those who are interested can keep in touch and join in the effort. A project website, twitter, and facebook updates are partnered with workshops in the communities, and a documentary is also being produced to chart their efforts.

Studying Tsunami Damage in Coastal Forests

Looking beyond the city, students examined the coastal landscape as well. In the six prefectures that suffered the most damage, about one third of the forests saw 75% of their area damaged by tsunami. Why did some trees fall victim to the tsunami but neighboring trees in the same forest survive unscathed? This project aimed to find the answer to that question by looking at the conditions of the impacted forests, and measuring factors such as land coverage and topography. The collected information was analyzed and insights shared in order to be useful in the development of plans for disaster prevention in coastal areas. Combining field studies with remote sensing imagery it was possible to learn how micro-topographical features and land coverage was connected to the degree of damage inflicted by the tsunami.

http://kesennuma.sfc.keio.ac.jp/pjkesen

Adapting to Climate Change in Mongolia

Dealing With Extreme Weather and Overgrazing

Mongolia is drawing considerable international attention for the degree to which it is suffering from the effects of climate change. Fully 70% of its area is given over to grazing and, in recent years, climate change has given rise to regular instances of a phenomenon known as “Zud.” The term traditionally refers to extremely snowy winters, but now distinction must be made between the so-called “White Zud,” which means heavy snowfall, and “Black Zud,” which refers to large-scale starvation caused by drought. Millions of livestock have died as a result of these episodes. Meanwhile, economic deregulation has profoundly changed Mongolia's traditionally nomadic culture. The number of animals raised by nomadic herders has risen sharply, placing acute pressure on grasslands. Furthermore, nomads are drawn to areas where transportation is easier and where access to roads and urbanization is convenient. Localized overgrazing from their livestock is accelerating deterioration of the grasslands in these areas.

High Hopes

Given that climate change is predicted to gather momentum, there are concerns that Mongolia’s communities face the possibility of even greater damage. The central government is working with research institutions and international teams to look into appropriate ways to manage and improve the situation.Under the Mongolia Project, a maximum number was established in each county for the nomad families and their livestock based on the environmental carrying capacity of the country’s grasslands. Through methods involving multiple agents, a simulation was developed to analyze the adaptive behaviors of nomads, and mobile phones were used to relay information to them about the ideal time to send their livestock to market. These form part of a pilot program to test the validity of the system.As the need to react to climate change becomes more urgent, the outcomes of the project are particularly timely and necessary.

Photos courtesy of Yan lab