SEDIFLUX highlights ESF snowball effect – shows how great momentum can be generated from modest investment

Polar and mountainous regions are most sensitive to climate change. The ESF's SEDIFLUX programme is playing a key role analysing the impact of climate changes and possible global warming on landforms, via the movement of sediment by rivers, glaciers, and wind.

The ESF's SEDIFLUX project has evolved into a coordinated multinational effort to monitor the changing structure of landforms in high latitudes and altitudes, yet was conceived in 2001 by just a single post doctoral researcher. Achim Beylich, who is now chair of SEDIFLUX, was then on a long summer field stay at a station attached to the highly successful ITEX (International Tundra Experiment). "I was fascinated by the idea, approach and enormous success of ITEX," says Beylich. "Such a multinational monitoring network was completely missing in my field of geomorphology."

That is not the case now, after three years of rapid evolution of the SEDIFLUX network leading to a series of coordinated multinational initiatives. "I think that the enormous growth of this initiative was not expected," admits Beylich. "It was a true "bottom-up process - a development starting at 'zero'."

It is too early yet to expect significant results, for monitoring sediment fluxes is a long-term exercise requiring patient and consistent observations over years and even decades. But the momentum generated by SEDIFLUX is ensuring that the monitoring systems are in place to collect the required data, not just in northern Europe and the Alps, but also in other polar or mountainous regions with similar climates, for example in arctic Canada and northern Siberia.

As Beylich notes, SEDIFLUX was in a sense overdue, given the importance of studying the likely impact of projected climate change on the land structure of polar environments. There is strong synergy with ITEX, whose objective is to determine the relationship between climate and the circumpolar plant species. Clearly the impact of climate on plant species would be mediated partly through changes in land structure brought about by sediment movements.

Against this background, the main achievements of SEDIFLUX so far have been in establishing a sustainable framework for long-term research. "We have defined initial key test sites where we will carry out monitoring campaigns with unified approaches and standardized methods," says Beylich. Such methods will enable landscape evolution to be interpreted

consistently, leading to a more accurate model relating changes in climate to geomorphology (the study of landform structure and processes). The factors determining the evolution of landforms include the rates of sediment flux and of denudation. Sediment in turn needs to be analysed in terms of its different constituent parts, which can be broken down in terms of size, source and chemical composition. It includes boulders at the top end of the scale down to fine silt, embracing sands, clays, calcium carbonates, heavy metals, and silica.

SEDIFLUX has laid the groundwork for further research after the programme ends in December 2006. “We are in the process of developing a SEDIFLUX Handbook which will provide guidelines for monitoring campaigns, sediment budget studies in cold environment catchments,” says Beylich. “Essential progress with this handbook was made during the Third SEDIFLUX Workshop in Durham (UK) last December, where all workshop participants were actively involved in the discussions”.

In fact SEDIFLUX will live on through the SEDIBUD programme set up by the International Association of Geomorphologists (IAG/AIG), a scientific, non-governmental and non-profit organisation, whose principal objectives are development and promotion of geomorphology as a science through international co-operation and dissemination of knowledge. All ESF SEDIFLUX members – about 280 from more than 30 countries – have been be invited to participate in SEDIBUD Workshops.

SEDIFLUX has been successful in forging the necessary collaboration between scientists in different disciplines, for example between geomorphologists and bioscientists; between hydrologists and ecologists; and between physical geographers and geologists. For example biologists have studied the establishment of pioneering vegetation in land that has only recently become free of ice cover during the summer through deglaciation, helping to stabilise the landscape.

Such collaborations are necessary not just to assemble appropriate scientific skills but also to develop the expertise in organising such a major long-term project. “The current steering committee of SEDIFLUX had never collaborated before, and the steering committee members have rather different backgrounds and represent a wide span of different ages,” notes Beylich. “Altogether it was a young and rather inexperienced steering committee which has over the last years made significant progress in getting experience, developing skills in communicating, and sharing responsibilities within SEDIFLUX.”

Lessons have been learnt from some of the other disciplines within which major projects are more common. “Geomorphologists are learning a lot from biologists and ecologists regarding coordinated large-scale initiatives,” says Beylich.

But now with the experience gained from SEDIFLUX the global geomorphology community has all the tools in place to conduct major research into the likely impact of climate change on sensitive polar and alpine regions.

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