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Factsheet Water and Food Video of ETH Zurich for the Swiss Pavilion at the Expo Milano 2015

Professor Dr. Paolo Burlando: The Jakarta Study

This study comprises two complementary perspectives on the degraded Ciliwung River in Jakarta, Indonesia. The Ciliwung River, one of Jakarta's 13 major rivers, runs through Jakarta DKI before draining into the Java Sea. The first perspective, from the Landscape Ecology Module, integrates multidisciplinary approaches to generate solutions at the scale of the river's catchment, corridor, and at individual urban sites. The second, from the Tropical Town synergy project, offers architectural designs and urban plans for communities that were displaced by flooding of the Ciliwung. It does so by working within the municipal government's social housing programme. The research involves mathematical modelling, as well architectural, urban and landscape design. Advanced 3D modelling is used to design and visualise proposed changes. Meanwhile, nested hydrologic, hydrodynamic and water quality models investigate the impacts of these changes. Finally, participatory planning and design methods involve residential communities in the shaping of their future environments. In this we work in two contexts: firstly with communities who live along the Ciliwung River's banks; and secondly a government-owned and –managed housing estate in Marunda, East Jakarta, where many communities affected by flooding have been relocated.

Claudia Röösli, PhD student: Monitoring of icequakes on Rhonegletscher

The study of small earthquakes in glaciers, so-called icequakes, can reveal important insights into the dynamics of glaciers and into their sub-glacial drainage system. In this project we monitor icequake activity on the Rhonegletscher, Switzerland. Among a dense network of 14 surface stations, which was deployed from end of July 2012 to mid October 2012, three shallow borehole seismometers are being operated for full year (May 2012 - May 2013). Considering the seasonal changes of the sub-glacial drainage system, such a longer term seismic monitoring will provide a test for the existing interpretation of basal icequakes: if these seismic events result from glacier uncoupling and re-coupling to its bed, then their activity should cease or at least change during early spring times when the sub-glacial drainage system is less efficient.

This unique data will help to improve our understanding of an Alpine glacier's dynamical behavior in relation to changes in the sub-glacial drainage system caused by climate change and glacier retreat, also affecting the Swiss Alps.

Professor Dr. Maria Schönbächler: How did water come to earth?

Prof. Schöbächler's team has found that volatile elements - most likely to include water - were present during the violent process of the Earth's birth between 30 and 100 million years after the solar system was created - a minute period in geological terms. The findings mean that comets and asteroids were unlikely to have brought the bulk of volatile elements to Earth - as commonly thought. Prof. Schönbächler proved that moderately volatile element Silver was present in

relatively large amounts towards the final stages of the Earth's formation. The radioactive isotope Palladium 107 decays to Silver 107, which was present during the formation of the solar system. The decay of Palladium 107 creates anomalies in the abundances of Silver isotopes, which can be measured and used for dating, even though Palladium 107 is no longer present on Earth. The findings give a new boost to a 30 year old model, which suggests that volatile elements were already present in the final stages of the Earth's birth.

Dr. Charlotte Decock: Nitrogene and Climate Change

In the context of improving agricultural sustainability, Charlotte focuses on the effects of agronomic management practices and environmental changes on nitrogen (N) cycling, especially emissions of nitrous oxide (N2O). The agricultural sector is the dominant emitter of this potent greenhouse gas and ozone depleting substance, where is it mostly produced during microbial transformations of fertilizer N in soil. Consequently, understanding the dynamics and fate of N in agricultural ecosystems is of pivotal importance to mitigate N2O emissions and improve the sustainability of our agroecosystems.

Professor Dr. Rainer Schulin: Zinc Biofortification of Wheat through Organic Matter Management in Sustainable Agriculture (ZOMM)

The trace element zinc (Zn) is an essential component of plants, animals and humans. Insufficient Zn supply is one of the most widespread problems in human nutrition worldwide. Zinc deficiency is particularly frequent where populations depend on cereals as staple food and lack access to meat and other sources of easily absorbable Zn in their diets. In many regions it is related to low Zn densities in cereal grains resulting from low availability of Zn in the soils of these regions. The problem is mostly not due to lack of Zn in soil per se, but to a lack of soil Zn in a form in which it is easily accessible for uptake by the plants. For this reason, Zn deficiency is also often a limiting factor for crop yields in developing regions.
In this project we investigate how organic matter can be used best in agricultural soil management to enhance the nutritional quality of wheat grains with respect to Zn density, while at the same time alleviating Zn deficiency stress to the plants and promoting soil fertility.

Professor Dr. Michael Siegrist: Novel dual purpose chicken production systems

Globally, there has been an intensive specialization in the poultry sector during the last 60 years. This was associated with a complete decoupling of egg and meat production. Poultry is no longer reared and bred on farm but is provided by few breeding companies, also for Swiss poultry farmers. Along with this system optimization, these practices are of increasing public concern as a large number of healthy animals, the laying type cockerels, are sacrificed). The overall objective of the proposed project is to make a significant contribution to establish dual purpose poultry systems. We therefore aim to research novel genotypes, understand the components of resulting production systems and investigate the determinants of consumer acceptance. In detail, biological and social science studies will be performed. Our investigation of the egg and meat production side of dual purpose systems will be detailed and from various angles. It will include their applicability and their valuation by consumers. With this, the key aspects of their adoption by farmers and consumers will be identified. Special focus is given to the conflict between animal welfare and food-feed competition (food security). It is especially investigated to which extent the expected lower feed conversion efficiency, characteristic for

dual purpose systems, can be counteracted by the possibility to feed these poultry genotypes partially with food industry byproducts instead of food that is also suitable for humans. Using the outcomes of the biological studies, consumers' perception of the resulting poultry products will be determined in focus group interviews and surveys on purchase decisions and acceptance. The project has several elements fostering teaching and capacity building. It includes a plan to disseminate our findings to all important target groups, which builds on various measures and distribution channels. In developing and adopting a dual purpose strategy, Switzerland could become a role model for other industrialized countries in this respect.