Impacts of climate change and land-use change on flood inundation: a coupled modelling a pproach

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Recent major floods around the world have raised concern that climate change is causing increases in the frequency and magnitude of high discharge events. Furthermore, the sensitivity of the system to climate change appears to have increased significantly as a result of anthropogenic land-use change. This study investigated the impacts of climate change and land-use change upon flood inundation using a coupled modelling approach in an upland catchment with downstream urbanized floodplains through continuous scenario-based simulations in the City of York, Yorkshire UK. It also investigated how the potential impacts of climate change and land-use change at the catchment scale could be alleviated to reduce flood risks. Flood alleviation measures were designed and fed into the coupled model to investigate their impacts on flood inundation. In particular, this focused on flood alleviation measures in relation to construction of flood defences, provision of washlands and increase of channel capacity due to sedimentation. This study also evaluated land management options in mitigating the flood risks in the future, including how they scale through to downstream effects, e.g. sediment delivery and floodplain inundation. Coupled continuous simulations of catchment-scale rainfall-runoff and reach-scale flood inundation for the next 100 years was carried out to derive flood inundation extents under different climate change, land-use change and flood alleviation scenarios. This allows integrated analysis of flood risks at both catchment and reach scales. This study addressed a much understudied aspect in flood risk management which is the impact of catchment-scale rainfall-runoff on flood risk in terms of flood inundation extent. This represents a more holistic approach that involves whole catchment and risk-driven adaptation to climate change.

Water abstraction from the Changjiang River downstream Datong and its impacts on water discharge into the estuary under the extreme drought of drainage basin

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Datong is a hydrometric station in lower reach of the Changjiang River, which is closest to the estuary. But the distance between Datong and the estuary is still about 500 km. The water level of the Changjiang River downstream Datong is affected by ebb and flow of tides, which produces the opportunities for areas along the Changjiang River to abstract water from it. And these are the most developed areas in the drainage basin. With the development of economy, the requirements for water resource of these areas increase quickly. And the water-abstracting projects increase continuously, including sluices and pump stations built at the estuary of branches, culverts along the bank, and other pump stations along the bank for life and corporations. At present, the total water-abstracting capacity reaches about 20000 m^3/s. Because the salt water intrusion in estuary became stronger and stronger in recent years, the problem about effects of water abstraction downstream Datong on water discharge into the estuary and salt water intrusion was paid attention to. In 2006, the extreme drought occurred in the upper and middle drainage basin of the Changjiang River. And the Three Gorge Dam stored water just in that period. As a result, the water discharge from the upper and middle basin decreased greatly. And the salt water intrusion in estuary was very strong, the occurring time was ahead of the usual about 2 months. But when salt water intrusion occurred first time in September the corresponding water discharge in Datong was still more than 17000 m^3/s. In this paper, the practical situation of water abstraction between September 2006 and April 2007 is estimated and analyzed, based on many observed day-by-day data and investigated data. And the effect of water abstraction on water discharge into the estuary is calculated and analyzed. The results show that, on the whole the rainfall was ordinary in areas downstream Datong and no severe drought occurred. The sluices and partial pump stations (especially the water-diversion projects between drainage basins) are the main water-abstracting projects, which greatly impacts the quantity of

water abstraction from the Changjiang River. And the water discharge of several branches is the important factor that impact the quantity of water drainage into the Changjiang River, such as Huaihe River, Guxi River, and Qingyijiang River. Water abstraction of sluices is regularly, which corresponds to the magnitude of tides. And the water discharge into the Changjiang River of some branches is also impacted by tides. In September and October 2006, the quantity of water abstraction is much more than water drainage. The net decreased water discharge reached more than 1400 m^3/s, which will affect the water discharge into estuary of the Changjiang River, especially when the water discharge from the upper and middle basin is low.

Krka river estuary (Eastern Adriatic Coast) evaluation of natural and anthropogenic in fluences by multielemental analysis

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The Krka river estuary is located on the Eastern Adriatic coast and is a typical highly stratified karstic estuary with fresh/brackish surface water layer flowing seawards and bottom upstream counter-current seawater flow. The estuary has a total length of 22 km, its deapth gradually increasing from 2-42 m. Input of terrestrial material into the Krka river estuary is relatively small and prevented by the number of calc tufa barriers at the river/estuary confluence. Due to the uniqueness of these tufa barriers and waterfalls, this area now is a National Park.
The town of Šibenik (40000 inhabitants) is located in the central part of the estuary. The main sources of anthropogenic pollution in this part of the estuary are phosphate-ore handling in the Šibenik port, the input of untreated wastewaters from the city of Šibenik and the now defunct factory of ferromanganese alloys. All these sources of pollution are now either inoperational or being remediated. Previous work established localized pollution with some elements (Hg, Mn, U, ref. 1, 2, 3), but assessment of the contamination of the entire area of the Krka river estuary with a variety of eco-toxic elements was never performed.
The aim of the work was to establish the degree of anthropogenic influences in the estuary by multielemental analysis of sediment and water. Surface sediments and sediment cores as well as surface water were analyzed for trace element composition by means of the HR ICP-MS (High Resolution Inductively Coupled Plasma Mass Spectrometry).
Obtained results indicate a clear anthropogenic point-source influence on several locations within the Krka river estuary. The most severe impact was established for the Šibenik port - for elements Hg, Cd, Zn, Pb, As and Cu and must be understood in terms of a combined effect of contamination related to phosphate-ore unloading over many years and input of untreated municipal wastewaters.
Further contamination of the estuarine sediment column was established in front of the closed ferromanganese-alloy factory, where high concentrations of Mn, Pb and Ba were measured. However, in the largest part of the Krka river estuary the concentrations of measured elements were low and within expected ranges of natural (lithogenic and marine) variations. This indicates that the major part of the Krka river estuary is still unpolluted.

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Increase in moon Jellyfish populations in Seto Inland Sea, Japan: possible effect on predator -prey enteractions under summer hypoxia

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