

Examination of disaster management measures covering rivers and erosion control based on the experiences of the 2017 northern Kyushu rainstorm

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In the intense rainstorm that hit northern Kyushu in July 2017, large volumes of water and sediment outflowed and overflowed wide areas during a short period of time in the narrow river basins consisting of mid-to-small rivers, which resulted in massive damage. NILIM dispatched three committee members to the restoration technology council installed for this disaster. Also, we are now developing technologies to implement disaster management measures covering rivers and erosion control based on the characteristics of water and sediment outflow in mid-to-small river systems.

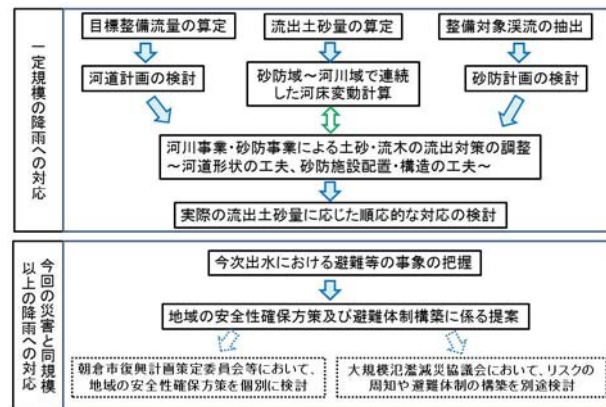
Social background and problems

- Enough time for evacuation cannot be secured in narrow river basins consisting of mid-to-small rivers because water and sediment outflow in wide areas from the upstream to downstream sections during a short period of time. People are helpless, especially on the flatlands at the bottom of a valley, if they miss the proper timing to evacuate.
- People tend to be less aware of potential risks of disasters near mid-to-small rivers, which are not designated as expected flooding areas.
- Methods to evaluate and respond to the risks covering the upstream to downstream sections must be promptly established by taking into account the characteristics of flooding and sediment overflow in mid-to-small rivers.

Content of this study

Examination of restoration support and disaster reduction measures at mid-to-small rivers

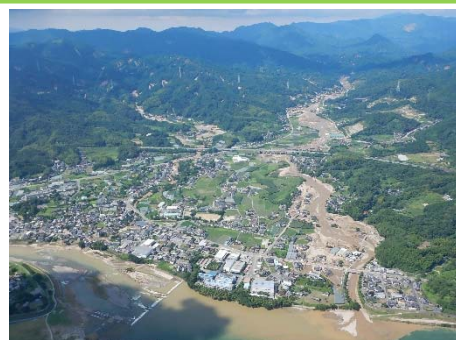
- Support for disaster investigation: River blockage using LP surveys or other measures, identification of the presence and condition of unstable soil—coarse sand, very coarse sand, and fine gravel are the main components of sediment blocking rivers. (Mid-sized gravel and large gravels are the main component of the original riverbed.)
- Support for river channel design based on planned rainfall: The amount of sediment supplied from upstream is estimated by taking into account the outflow of sediment from unstable soil accumulating on slopes—support for the design of cross-sectional and longitudinal river channel design, which is easy to maintain using riverbed variation calculation
- Support for the examination of regional safety measures targeting simultaneous collapses that may occur during the same level of rainstorm (support for examining vulnerability to flooding along rivers during a flood exceeding a designed level and information related to water hazard risks)
- Support for examining methods of adaptive responses at mid-to-small rivers reflecting chronological changes in unstable sediment in upstream sections



Concept of restoration based on cooperation among river projects, erosion control projects, and regional measures (partially modified from p. 101 of the Report by the River and Erosion Control and Restoration Technology Council at the Right Basin of the Chikugo River (Nov. 2017))

Improvement of the precision of the method to forecast water and sediment outflow in upstream sections

- Organize the conditions of sediment production and outflow to improve the precision of methods to forecast the amount of debris flow generated in mountain torrents where sediment is mainly generated and the amount of sediment outflow covering from debris flow zones where the river bed gradient is large and flooding zones where the river bed gradient is small.
- Organize the thickness of sediment accumulation near houses and the actual damage to the houses to improve the precision of methods to forecast damage to houses based on the thickness of sediment accumulation.
- Aim to establish methods to estimate areas where training may appear using the amount of vapor and atmospheric instability as indexes and methods to forecast the risk of the onset of sediment disasters.



The production of sediment in upstream sections and the outflow of the sediment in downstream sections

Reduction of damages caused by heavy rainstorms occurring in higher frequency and greater intensity in many of the mid-to-small rivers located around Japan without sufficient sediment and flood control measures

Relevant articles

- Actual conditions of sediment outflow and damages to houses in the rainstorm that hit northern Kyushu in July 2017
- Promotion of damage reduction measures by sharing the diagrams of flooding vulnerabilities along mid-to-small rivers in mountainous regions