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Title and Authors of the research work

SEDIMENTOLOGIC INFLUENCE OF TORRENT CHECK DAM SYSTEMS ON SHORELINE CHANGES IN SEMI-ARID MEDITERRANEAN AREA: A SUB-REGIONAL ANALYSIS IN CALABRIA (SOUTHERN ITALY)

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Abstract of contents

The evolving shoreline asset represents the dynamic synthesis of the sediment mass balance at watershed mouths as depending on natural agents (mainly floods and sea storms) and anthropogenic interventions both on inland areas and coastal strips. Many coastal areas around the world show a significant trend to shoreline retreat. Torrent control works, such as check dam cascades, usually addressed to face the hydro-geological instabilities and disorders (often driven by land-use changes) typical of the semi-arid Mediterranean environment, may represent one significant acting factor over the history of the so-called *sediment continuum*. The Calabria region, Southern Italy, with its 750 km coastline, can represent a reference case with respect to the concerned matter, given that the watershed geomorphological, hydrological and sedimentological characteristics have brought to the implementation, since 1954, of intensive programmes of torrent control accompanied by coastal control structures.

The research work aims to extrapolate the influence of check dam systems on the shoreline evolution at watershed mouths. Based on a methodological approach already developed by the same Authors, the monitoring surveys in five historical windows (years 1954, 1970’s, 1980’s, 1990’s and 2019-2021) and the subsequent data elaboration and analysis were extended to 8 Calabrian watersheds (of 39,2 to 160,3 Km²), distributed between the opposite sides (Tyrrhenian and Ionian) of the Aspromonte Massif, classified, according to the linear density of control structures in the main torrent reaches, as “medium-highly structured” (5 cases) and “lowly structured” (3 cases) watersheds.

The investigation, involving about nine hundreds check dams (completely filled just a few years after their construction), explored the relationships between the trapped sediment volume in the “mountain”, “intermediate” and “valley” main torrent reaches and the shoreline changes. Although the other processes explaining the complexity of the sedimentary shoreline dynamics are not taken into consideration, the analysed observations allowed to recognise the influence of check dam systems and related sediment transport control on the shoreline evolution and, according to a comprehensive and integrated approach to the management of the *watershed-coast continuum*, suggests to pay a careful attention to check dam systems within the valley torrent reaches of the watershed. The achieved results, supported by cause-effect evidence, should tribute to a general debate on the inter-relationships and integrated evaluations between the relevant need of hydraulic control structures within the watershed and its complex hydro-geomorphology and the parallel consistent need to guarantee a stability of the desired shoreline asset, also to minimise supplementary financial investments in coastal protection measures.

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