CREATING A WATERSHED CONTEXT FOR RESTORATION PLANNING

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NetMap

Community Digital Watersheds & Shared Analysis Tools (www.netmaptools.org)

(1) Reconstructing Fluvial Landscapes in Controlled Rivers

In watersheds with a long history of river control (levees, dams, development), information on the extent of the natural fluvial landscape (floodplains, side channels, wetlands) may be unavailable. This is the case in the Pas River in northern Spain.

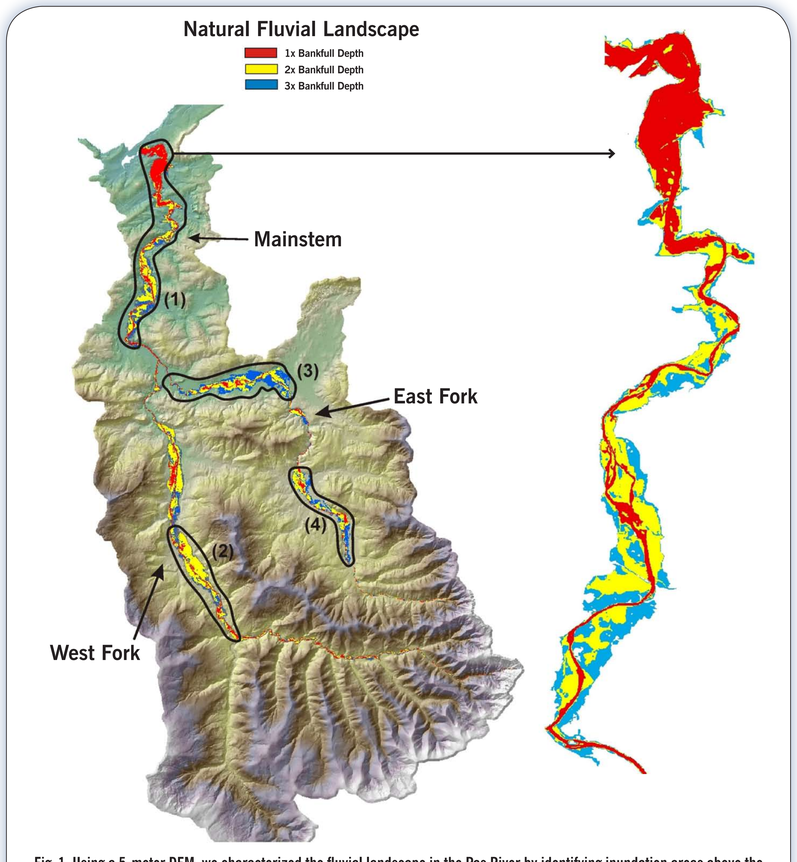


Fig. 1. Using a 5-meter DEM, we characterized the fluvial landscape in the Pas River by identifying inundation areas above the channel equal to 1X, 2X and 3X bankfull depths. The predicted fluvial landscape using NetMap's floodplain tool is patchy and distributed according to basin topography, valley morphology, river network structure and fan and terrace landforms.

(2) Methods

General principles of hydro-geomorphic processes were used with computer analysis tools (NetMap) to evaluate the potential for interactions of channel to floodplain, fluvial to riparian and tributary to tributary (via confluences) environments.

Analyses involved:

- Creating a synthetic stream layer,
- Predicting inundation areas (floodplain, off channel areas, Fig. 1),
- Predicting tributary confluence effects,
- Predicting spatially variable sediment yields,
- Mapping valley morphology and
- Creating valley cross section profiles.

NetMap contains automated tools for efficiently performing each of these tasks. NetMap is being used in the MARCE project in the northern one third of Spain in collaboration with Earth Systems Institute.

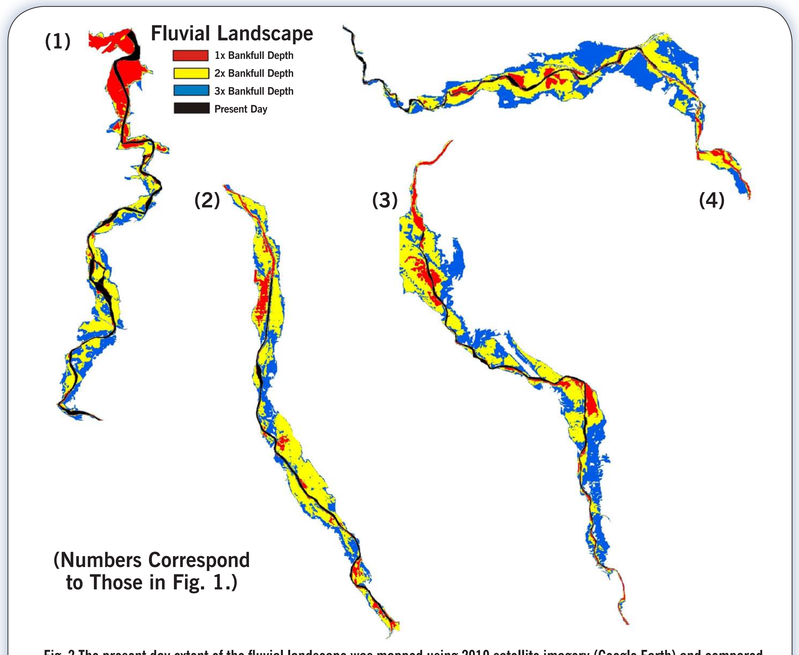
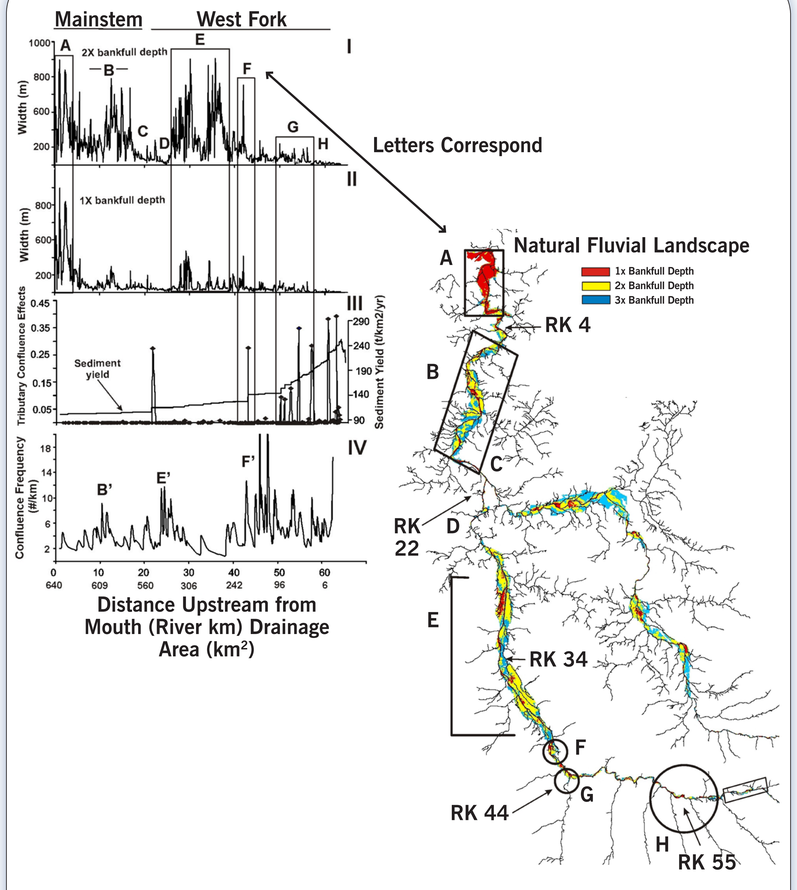


Fig. 2 The present day extent of the fluvial landscape was mapped using 2010 satellite imagery (Google Earth) and compared to the predicted fluvial landscape at one, two and three bankfull depths above the channel. Ninety percent of the fluvial landscape has been masked by human infrastructure.

(3) Patterns and Processes in the Fluvial Landscape



Figs. 3 and 4. The spatially variable width of the fluvial landscape (I, II) corresponds to locations of tributary confluences that reflect network structure, variations in valley morphology and patterns of sediment yields (III, IV).

(4) Restoration Planning

The reconstructed fluvial landscape can be used to help guide restoration planning by identifying areas where ecological productivity and diversity could be restored through in-channel, floodplain and riparian restoration projects.

Meso scale geomorphic domains for restoration include (Fig. 5):

(I) Broad valleys-complex floodplains;
(II-IV) Individual large river bends, confluences and valley transition zones;
(V) Narrow valleys-string of pearls and
(VI) Lower river-estuarine environments (Fig. 4, A).

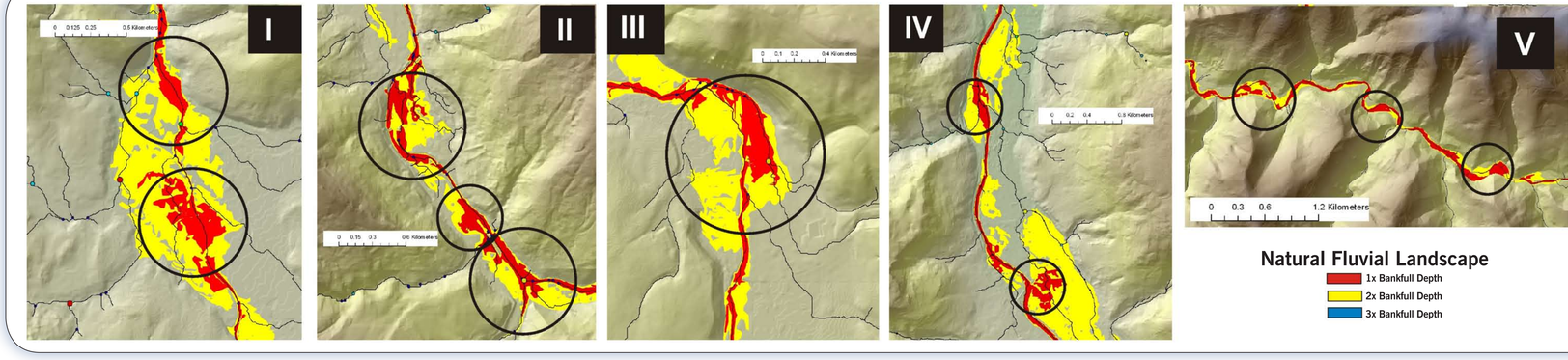


Fig. 5 Several examples are shown of geomorphic hotspots where restoration could be targeted. Only 10% of the identified zones (in yellow and red) are contained within the present day fluvial landscape.

Refer to NetMap Technical Help for relevant citations.

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Contact Earth Systems Institute at: www.earthsystems.net or www.netmaptools.org