



# Monitoring and assessing the destruction of archaeological sites from Kuibyshev reservoir coastline, Tatarstan Republic, Russian Federation. A case study

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Received: 28 October 2016 / Revised: 28 December 2017 / Accepted: 29 December 2017 / Published online: 11 January 2018  
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## Abstract

The paper presents the research undertaken in the coastal area of Kuibyshev Reservoir from Republic of Tatarstan, Russia. The aim of the research is to assess the erosion rate of the coastline, to identify the most dynamic parts, and to improve the predictions of the future archaeological sites being under threat from coastal erosion. As a baseline, Soviet aerial images and topographic surveys were combined in a GIS in order to create a database and a 3D model of the coastline, which will serve as a base for future surveys. The most dynamic part is located in the North-western part, from 1958 until 1980 (22 years), 150 m from the coastline being eroded (6.81 m/year), leading to the complete disappearance of the hillfort, only the South-eastern bastion remaining. The coastline is very dynamic, with an increasing erosion rate from 2012, when the first topographic surveys were undertaken. There have been proposed mitigation measures, the most significant one is to completely eliminate the exploitation road along the coastline.

**Keywords** Coastal erosion · Cultural heritage · Volga · 3D coastal modelling · GIS

## Introduction and archaeological background

The building of dams and reservoirs and the effect they have on the ecosystem is well documented in the scientific literature regarding the disruption of patterns and rates of flow; flow regulation minimises the extremes of flow, resulting in a lower

flood peak and modifying base flow conditions (Romanescu and Stoleriu 2014). Moreover, they act as a barrier to sediment transfer, this having an effect on river structure upstream and downstream. Not only they affect the hydrological regime, they induce changes to thermal regimes, water quality, biogeochemical fluxes (Brierley and Fryirs 2005), and the local microclimate. All these factors are contributing to the triggering and evolution of the coastal erosion processes.

Coastal erosion is a result of the combination of different factors – both natural and human-induced – with different patterns in time and space and have different nature (continuous or incidental, reversible or non-reversible). Damages caused to cultural heritage sites are most of the times irreversible and data with significant cultural and archaeological value is being lost. Cultural heritage is an expression of the way in which a community developed and lived, passed on to future generations, including customs, practices, places, objects, artistic expression, and values. Archaeological sites are included within the branch of cultural heritage – tangible – immovable.

Worldwide, studies regarding the destructive effects of natural (Romanescu and Nicu 2014, Sdao and Simeone 2007, Margottini et al. 2015, Nicu 2016; Nicu and Romanescu 2016; Nicu 2017a, 2017b), and anthropogenic factors (Lazzari et al. 2006; Gainullin et al. 2016) on cultural heritage

**Electronic supplementary material** The online version of this article (<https://doi.org/10.1007/s11852-017-0590-9>) contains supplementary material, which is available to authorized users.

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