Supplementary Information

Table S1. Scores reflecting the changes for human pressure indicators.

Human Pressure	Indicator	Data Used in This Study (Period)	Classes (Acronyms)	Score	References for Indicators and Classes
On longitudinal continuity upstream, on the basin scale	Basin area upstream dams and reservoirs	Other published studies [1,2]	0	0	[3]
			0%–33%	3	
			33%–66%	6	
			>66%	9	
	Other interventions on river longitudinal continuity upstream (e.g., weirs, check dams, bridges)		Absent (A)	0	We extended the analysis of these indicators from local scale to catchment scale based also on [3].
			Moderate (M)	3	
			Intense (I)	6	
On longitudinal continuity, on the local scale	Number of local weirs or check dams on sector length	Orthophotos (2010)	0	0	[3]
			<1/1 km	4	
			>1/1 km	6	
	Number of local bridges on sector length		0	0	
			<1/1 km	2	
			>1/1 km	3	
On lateral continuity, on the local scale	Length of bank protection from both banks length		<5%	0	
			5%–33%	3	
			>33%	6	
	Length of reforested banks from both banks length		<5%	0	Bravard *et al.* [4] consider that forestation favored the lateral stability of river channel.
			5%–33%	2	
			>33%	3	
	Length of levees (close or at the contact) from both banks length		<10%	0	[3]
			10%–50%	3	
			>50%	6	
On the substrate	Length of quasi-impermeable revetments on sector length		0	0	
			<1/1 km	3	
			>1/1 km	6	
	Length of rectifications from sector length		0	0	
			<10%	2	
			>10%	3	
Various impacts	Local sediment mining activity (in-stream, from the floodplain)		Absent (A)	0	
			Moderate (M)	3	
			Intense (I)	6	
	Wood removal	Field surveys	Absent (A)	0	
			Moderate (M)	2	
			Intense (I)	5	
	Removal of riparian vegetation		Absent (A)	0	
			Moderate (M)	2	
			Intense (I)	5	

Table S2. Scores of change/trend for channel form indicators.

Channel Adjustments	Indicator	Data Used in This Study (Period)	Classes	Score	References for Indicators and Classes
Longitudinal Lateral	Wavelength Streamwise length Sinuosity index Amplitude Radius of curvature (r_c) Width (w) r_c/w	Topographic maps (1954) & Orthophotos (2005)	No change (NC)	0	Meanders' geometry parameters are calculated based on the scheme of Leopold *et al.* [5]. The change in meander geometry for 1954 and 2005 time horizons was compared with Mann-Whitney non-parametric test [6].
			Change (C)	6	
Vertical	Cross-sectional area Maximum depth Width–to–mean–depth ratio	Cross profiles (1966–2010)	Trend (T)	0	Cross-section area was previously used by Salit [7], maximum depth by James [8] and width–to–mean–depth ratio by Rasmussen and Mossa [9]. We evaluated the trend of area, maximum depth and width–to–mean–depth ratio time series for 1966–2010 by using non-parametric test of Mann-Kendall [10].
			No trend (NT)	6	

Table S3. Scores of change for functionality indicators.

Functionality	Indicator	Data Used in This Study (Period)	Classes (Acronyms)	Score	References for Indicators and Classes
Within the valley	Presence of a continuous and large floodplain from both banks length	Orthophotos (2010)	>66%	0	[11]
			10%–66%	3	
			<10%	5	
	Connectivity between terraces and river corridor from both banks length		>90%	0	
			33%–90%	3	
			<33%	5	
Within the erodible corridor	Intensity of lateral migration of meanders	Topographic maps (1954) & Orthophotos (2005)	Intense (I)	0	Lateral migration of meanders is compared with the types proposed by Hooke [12].
			Moderate (M)	2	
			Absent (A)	5	
	Intensity of cut-off process before and after 1954	Other published studies [2]	Same or more intense (>I)	0	
			Less intense (<I)	6	
	Presence of accumulation forms (*i.e.*, above-water bars devoid of vegetation in the vicinity of convex banks of analyzed meanders)	Orthophotos (2010)	Intense (I)	0	[11]
			Moderate (M)	2	
			Absent (A)	3	
	Length of a potentially erodible corridor from both banks length		>66%	0	
			33%–66%	3	
			<33%	6	

Table S3. *Cont.*

Functionality	Indicator	Data Used in This Study (Period)	Classes (Acronyms)	Score	References for Indicators and Classes
Within the river channel	Composition of the substrate	Cross-sectional profiles (1966–2010)	No change (NC)	0	[11]
			Change to a similar grain size particles (~C)	2	
			Change (C)	5	
	Presence of large wood in-stream	Field surveys	Present (P)	0	
			Absent (A)	3	
Connectivity with the floodplain	Presence of oxbow wetlands	Orthophotos (2005)	Present (P)	0	
			Absent (A)	6	
	Return period of bankfull discharge (Q_b)	Cross profiles (1966–2010) & Maximum annual discharges (1961–2010)	1–2 years	0	The return period of Q_b was estimated based on Log-Pearson III distribution; this distribution is derived from three-parameter gamma distributions by logarithmic transformation and is a popular choice for fitting the frequency distribution of extreme hydrologic data such as annual flood data [6]. Q_b with a return interval of 1–2 years is considered normal by Leopold [13]; 50 years is the life span of levees [14].
			2–50 years	3	
			>50 years	6	
	Frequency of geomorphologically efficient floods (Q_{10})	Maximum annual discharges (1961–2010)	Several times	0	Q_{10} was estimated based on Log-Pearson III distribution. Q_{10} is considered geomorphologically efficient floods [15].
			One time	3	
			Never	6	

Scores for pressure and alteration indicators on the Lower Prahova River

Indicators of pressures

- Basin area upstream dams and reservoirs—score = 6. We took into account six dams (Figure 1c), with or without reservoirs; according to data from Aquaproiect [1] they account for 34% of Prahova basin area.
- Other interventions on river longitudinal continuity upstream (e.g., weirs, check dams, bridges)—score = 3. We counted 41 bridges crossing Prahova River upstream the analyzed sector. Previous studies [2] showed several examples of weirs located downstream bridges in order to protect them from channel incision. Taking into account their number and roles, we estimated a moderate impact of these interventions on fluvial dynamics.
- Number of local weirs or check dams on sector length—score = 0. Absence of investigated elements.
- Number of local bridges on sector length—score = 2. We counted 8 bridges crossing the analyzed sector (length = 90 km), accounting for a density of 0.09 bridges/km.

- Length of bank protection from both banks length—score = 0. Absence of investigated elements.
- Length of reforested banks from both banks length—score = 2. We calculated a length of reforested banks of 27% of both banks.
- Length of levees (close or at the contact) from both banks length—score = 0. We calculated a length of levees for defense against flooding of 2.6% of both banks.
- Length of quasi-impermeable revetments on reach length—score = 0. Absence of investigated elements.
- Length of rectifications from reach length—score = 0. Absence of investigated elements.
- Local sediment mining activity (in-stream, from the floodplain)—score = 0. Absence of investigated elements.
- Wood removal—score = 0. Absence of investigated elements.
- Removal of riparian vegetation—score = 0. Absence of investigated elements.

Indicators of alteration: channel adjustments

- Wavelength—score = 0. Mann-Withney two-tailed test detected no statistically significant changes between 1954 and 2005.
- Streamwise length—score = 0. Mann-Withney two-tailed test detected no statistically significant changes between 1954 and 2005.
- Sinuosity index—score = 0. Mann-Withney two-tailed test detected no statistically significant changes between 1954 and 2005.
- Amplitude—score = 0. Mann-Withney two-tailed test detected no statistically significant changes between 1954 and 2005.
- Radius of curvature (r_c)—score = 6. Mann-Withney two-tailed test detected statistically significant changes between 1954 and 2005. Mann-Withney upper-tailed test indicated lower values in 2005 when compared to 1954.
- Width (w)—score = 6. Mann-Withney two-tailed test detected statistically significant changes between 1954 and 2005. Mann-Withney upper-tailed test indicated lower values in 2005 when compared to 1954.
- r_c/w—score = 0. Mann-Withney two-tailed test detected no statistically significant changes between 1954 and 2005.
- Cross-sectional area—score = 0. Mann-Kendall two-tailed test detected no statistically significant trend in data series from 1966–2010.
- Maximum depth—score = 0. Mann-Kendall two-tailed test detected no statistically significant trend in data series from 1966–2010.
- Width–to–mean–depth ratio—score = 6. Mann-Kendall two-tailed test detected a statistically significant trend in data series from 1966–2010. Mann-Kendall lower-tailed test indicated a decreasing trend in data series from 1966–2010.

Indicators of alteration: functionality

- Presence of a continuous and large floodplain from both river banks—score = 0. We considered that the Lower Prahova River crosses a lowland, therefore, we assumed that it crosses a continuous and large floodplain.

- Connectivity between terraces and river corridor from both banks length—score = 0. We considered Lower Prahova River to be connected with the terraces on 97.4% from both banks (except for levees for protection against floods).
- Intensity of lateral migration of meanders—score = 2. We considered the presence of one rotation and one extension processes between 1954 and 2005 as a moderate intensity of lateral migration of meanders.
- Intensity of cut-off process before and after 1954—score = 6. We considered the cut-off process as being less intense after 1954, because 2 cuts-off happened between 1954 and 2005 compared to 12 cuts-off between 1900 and 1954 (Table S4).
- Presence of erosion and accumulation processes in the river channel—score = 2. We counted 14 examples of accumulating convex banks with bars devoid of vegetation among 52 analyzed meanders, which we classified as moderate intensity of meandering process.
- Length of a potentially erodible corridor from both banks length—score = 0. We estimated the length of the potentially erodible corridor as corresponding to 70.4% from both banks (except for reforested banks and levees for defense against flooding).
- Composition of the substrate—score = 2. We noticed on cross-sectional profiles that grain-size diminished from gravel and sand before 1995 to only sand exclusively after 1995.
- Presence of large wood in-stream—score = 0. We recorded occasionally presence of trunks and branches.
- Presence of oxbow wetlands—score = 2. We determined that all the oxbow wetlands present in 1954 were still functioning in 2005.
- Return period of bankfull discharge (Q_b)—score = 3. We estimated Q_b at 278 m^3/s and the return period at 2.8 years.
- Frequency of geomorphologically efficient floods (Q_{10})—score = 0. We estimated Q_{10} at 550 m^3/s and we counted five geomorphologically efficient floods during the analyzed time horizon (in 1966, 1972, 1975, 1997, and 2005).

Table S4. Cut-off of meanders during 1900–2005 time horizon.

Year	Number of Meanders	Period	Number of Cuts-Off
1900	52	1900–1954	12 [2]
1954	53		
2005	52	1954–2005	2

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