Sopot 30th December 2025

Final report of project RIS 12284, supported by Svalbard Miljovernfond nr 23/12

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Land promontories as coastal biota monitoring sites on Spitsbergen. Job for citizen scientists.

Introduction:

The climate change drives the change of coastal – intertidal ecosystem on Svalbard. This is partly driven by the ice retreat, temperature rise, but first of all by the advection of waters from the south. Boreal species, marine litter, driftwood etc floats with the sea currents and reach Spitsbergen shores, touching the land extensions first. Peninsulas, capes, especially at South- West and North Spitsbergen are the indicative sites for this southern transport. From the genetic analysis of boreal organisms found on the Spitsbergen shores, we know, that species arrive from the wide area of North Atlantic, from North America, Iceland, Scotland, Faroe and Norway. This provides the genetic diversity and wealth of possibilities for colonization the Arctic shores. We plan to document the significance of selected land promontories for the early detection of new species arrival as well as the plastic litter loads. The litter issue is of special importance for Svalbard, as plastic transport will be likely increasing, and European Arctic is commonly referred to as a "dead end" of Atlantic litter transport.

Project web page:

https://old.iopan.pl/projects/key_coastal_points/reports.html

Summary of results

Over 220 sites around Svalbard were visited for the macroplastic count (directly on site) and simultaneous driftwood count (satellite imagery). As was expected the land promontories facing NW of Svalbard were the sites with highest density of macroplastic items as well as highest driftwood count. The fishing remains (nets, ropes, boxes, buoys) were the most common items, followed by plastic bottles and household remains. Range of estimated macroplastic mass goes from 123 to 519 tonnes on Svalbard (along 77% of its entire coastline). Encrusting organisms (mussels, barnacles, bryozoans and hydrozoans) were found on large items and on the NW coast only. The topography of the shore (low sedimentary coast versus rocky reflective coast) was of key importance for the litter accumulation.

Area of key importance for the southern species arrival to Svalbard are the NW area between outer Magdalenafjorden and Grahuken

All source data (tables with georeferenced plastic count, photos of the litter) are stored in the data repository at IOPAN and are available free on the project web page.

Documentary movie (20 minutes) was produced and broadcasted on nature film festivals and free on the You tube.

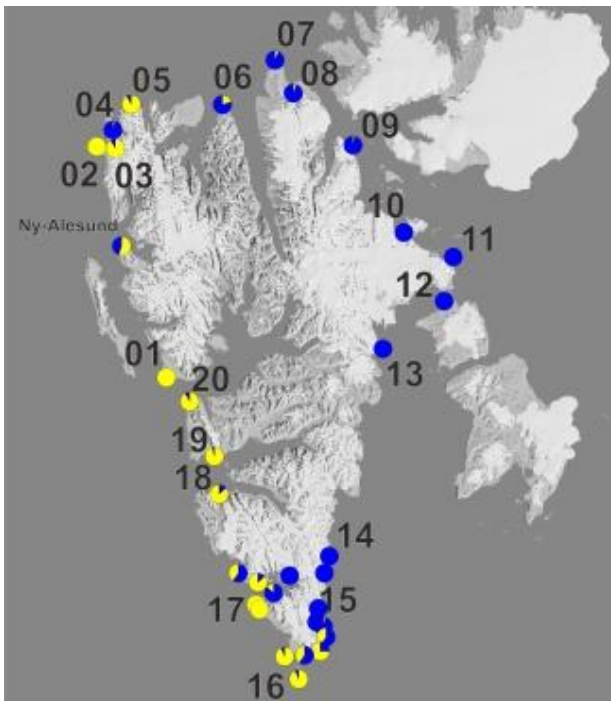
Two research papers are under preparation, based on this project data.

The leaflet describing methodology was distributed among researchers and volunteers that were interested in the project:

There are three steps for costal observation

1. *Take a general photo how look the shore from the water line level .*
2. *Look for stones, rocks, skjerra – if they are nearby take a photo from 1m distance showing the hard substrate – how it is covered with algae/organisms or they are barren.*
3. *If there is a low tide – look for the loose stones and check underneath if there are*
4. *crustaceans (few cm long) collect from few to several specimens into the plastic jar. If there are barnacles, bivalves or snails on the rocks – collect few specimens into the plastic jar. You may collect them by hand, spoon or little net, whatever works. Take a note about date, hour, place name, if possible geographic position. Fix the collected organisms in alcohol above 50% strong.*

Example of general and close up photo.



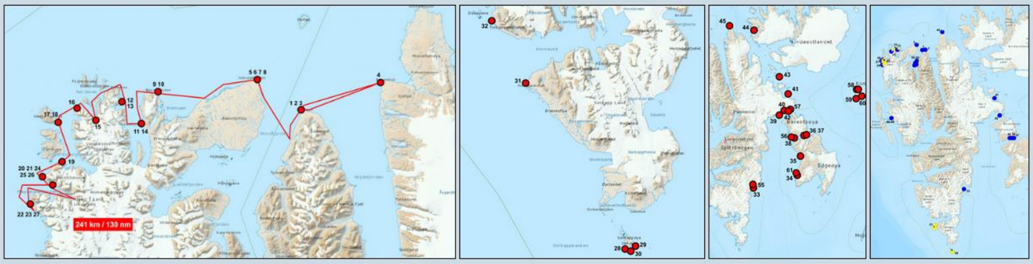
Crustaceans under stones on the low water level.

Example map shows occurrence of Atlantic (yellow) versus Arctic (blue) species of coastal crustaceans on Spitsbergen as of 2019.

Field work completed:

Summer 2024 sampling

Fig. 1 Sampling stations maps



Sampling stations and route covered by boat team North West Spitsbergen 18-26th August 2024, RIS 12284

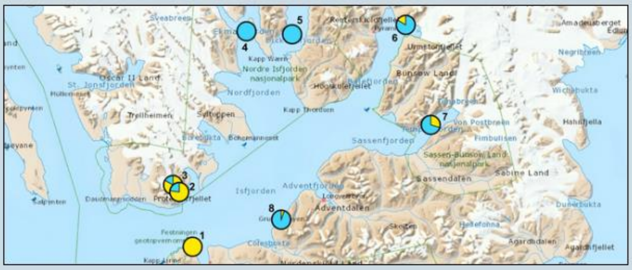
Sampling stations covered by team South Spitsbergen 12-17th August 2024

Sampling stations covered by team East Spitsbergen 15-30th August 2024

Gammarus species distribution: blue *G.setosus*, yellow *G. oceanicus*

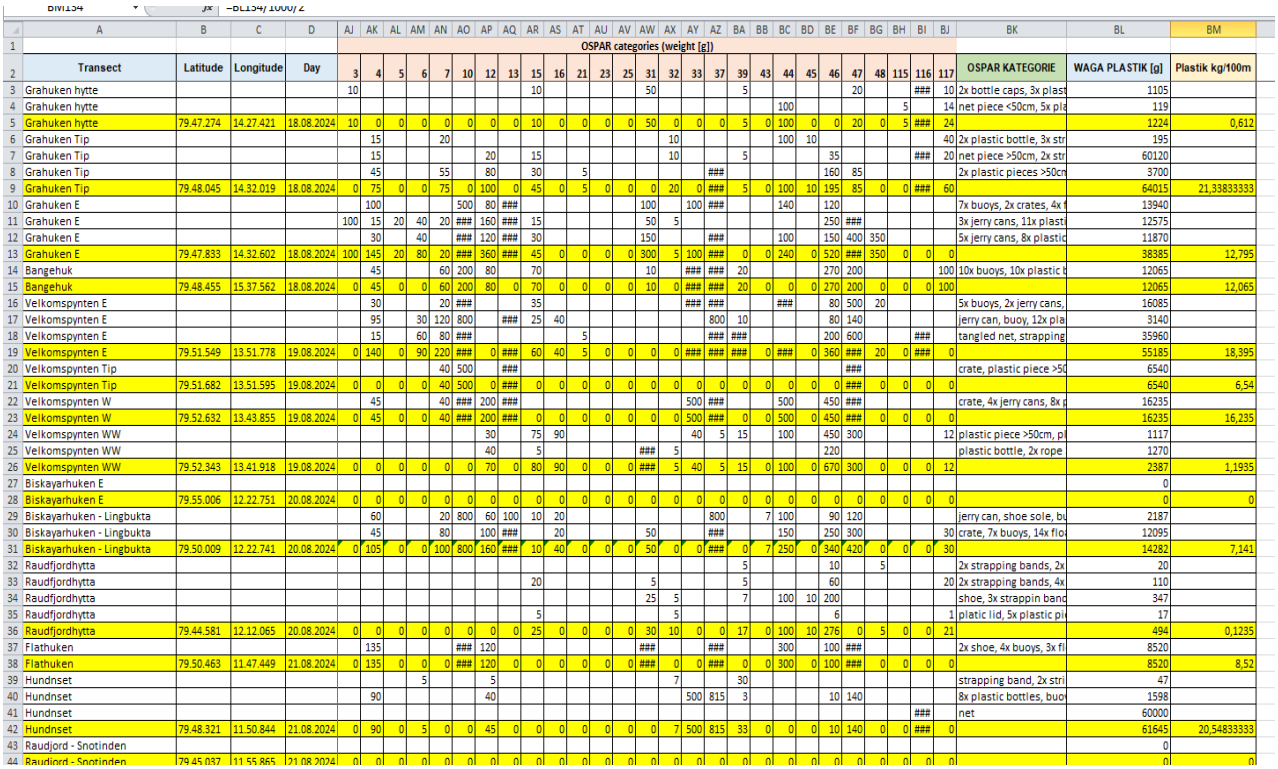
Summer 2023 and 2025 sampling

Fig. 2 Sampling stations map



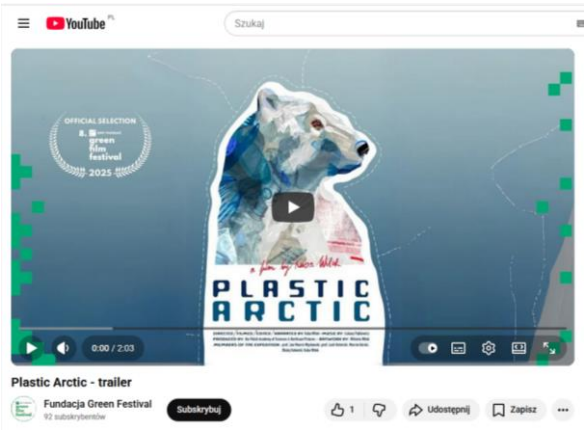
Example of photo from the plastic count (Sorkappoya 2024) – all georeferenced photos on the project web site https://old.iopan.pl/projects/key_coastal_points/reports.html

Example of source table from plastic count and classification (all tables on the project web site)



	A	B	C	D	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM
1					OSPAR categories (weight [g])																													
2	Transect	Latitude	Longitude	Day	3	4	5	6	7	10	12	13	15	16	21	23	25	31	32	33	37	39	43	44	45	46	47	48	115	116	117	OSPAR KATEGORIE	WAGA PLASTIK [g]	Plastik kg/100m
3	Grahuken hytte				10								10					50				5					20			###	10	2x bottle caps, 3x plast	1105	
4	Grahuken hytte																							100					5		14	net piece <50cm, 5x pla	119	
5	Grahuken hytte	79.47.274	14.27.421	18.08.2024	10	0	0	0	0	0	0	0	10	0	0	0	0	50	0	0	0	5	0	100	0	0	20	0	5	###	24		1224	0,612
6	Grahuken Tip					15			20										10					100	10						40	2x plastic bottle, 3x str	195	
7	Grahuken Tip					15					20		15						10			5				35				###	20	net piece >50cm, 2x str	60120	
8	Grahuken Tip					45			55		80		30		5						###					160	85					2x plastic pieces >50cm	3700	
9	Grahuken Tip	79.48.045	14.32.019	18.08.2024	0	75	0	0	75	0	100	0	45	0	5	0	0	0	20	0	###	5	0	100	10	195	85	0	0	###	60		64015	21,33833333
10	Grahuken E					100				500	80	###						100		100	###			140		120						7x buoys, 2x crates, 4x t	13940	
11	Grahuken E				100	15	20	40	20	###	160	###	15					50	5							250	###					3x jerry cans, 11x plasti	12575	
12	Grahuken E					30		40		###	120	###	30					150			###			100		150	400	350				5x jerry cans, 8x plastic	11870	
13	Grahuken E	79.47.833	14.32.602	18.08.2024	100	145	20	80	20	###	360	###	45	0	0	0	0	300	5	100	###	0	0	240	0	520	###	350	0	0	0		38385	12,795
14	Bangehuk					45			60	200	80		70					10		###	###	20				270	200				100	10x buoys, 10x plastic b	12065	
15	Bangehuk	79.48.455	15.37.562	18.08.2024	0	45	0	0	60	200	80	0	70	0	0	0	0	10	0	###	###	20	0	0	0	270	200	0	0	0	100		12065	12,065
16	Velkomspynten E					30			20	###			35							###	###			###		80	500	20				5x buoys, 2x jerry cans,	16085	
17	Velkomspynten E					95		30	120	800		###	25	40							800	10				80	140					jerry can, buoy, 12x pla	3140	
18	Velkomspynten E					15		60	80	###					5						###	###				200	600			###		tangled net, strapping	35960	
19	Velkomspynten E	79.51.549	13.51.778	19.08.2024	0	140	0	90	220	###	0	###	60	40	5	0	0	0	0	###	###	###	0	###	0	360	###	20	0	###	0		55185	18,395
20	Velkomspynten Tip								40	500		###															###					crate, plastic piece >50	6540	
21	Velkomspynten Tip	79.51.682	13.51.595	19.08.2024	0	0	0	0	40	500	0	###	0	0	0	0	0	0	0	0	0	0	0	0	0	0	###	0	0	0	0		6540	6,54
22	Velkomspynten W					45			40	###	200	###								500	###			500		450	###					crate, 4x jerry cans, 8x p	16235	
23	Velkomspynten W	79.52.632	13.43.855	19.08.2024	0	45	0	0	40	###	200	###	0	0	0	0	0	0	0	500	###	0	0	500	0	450	###	0	0	0	0		16235	16,235
24	Velkomspynten WW										30		75	90						40	5	15		100		450	300				12	plastic piece >50cm, pl	1117	
25	Velkomspynten WW										40		5					###	5							220						plastic bottle, 2x rope	1270	
26	Velkomspynten WW	79.52.343	13.41.918	19.08.2024	0	0	0	0	0	0	70	0	80	90	0	0	0	###	5	40	5	15	0	100	0	670	300	0	0	0	12		2387	1,1935
27	Biskayarhuken E																																0	
28	Biskayarhuken E	79.55.006	12.22.751	20.08.2024	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0
29	Biskayarhuken - Lingbukta					60			20	800	60	100	10	20							800		7	100		90	120					jerry can, shoe sole, bu	2187	
30	Biskayarhuken - Lingbukta					45			80		100	###		20				50			###			150		250	300				30	crate, 7x buoys, 14x flo	12095	
31	Biskayarhuken - Lingbukta	79.50.009	12.22.741	20.08.2024	0	105	0	0	100	800	160	###	10	40	0	0	0	50	0	0	###	0	7	250	0	340	420	0	0	0	30		14282	7,141
32	Raudfjordhytta																					5				10		5				2x strapping bands, 2x	20	
33	Raudfjordhytta												20					5				5				60					20	2x strapping bands, 4x	110	
34	Raudfjordhytta																	25	5			7		100	10	200						shoe, 3x strappin banc	347	
35	Raudfjordhytta												5						5							6					1	platic lid, 5x plastic pi	17	
36	Raudfjordhytta	79.44.581	12.12.065	20.08.2024	0	0	0	0	0	0	0	0	25	0	0	0	0	30	10	0	0	17	0	100	10	276	0	5	0	0	21		494	0,1235
37	Flathuken					135				###	120							###			###			300		100	###					2x shoe, 4x buoys, 3x fl	8520	
38	Flathuken	79.50.463	11.47.449	21.08.2024	0	135	0	0	0	###	120	0	0	0	0	0	0	###	0	0	###	0	0	300	0	100	###	0	0	0	0		8520	8,52
39	Hundnset							5			5								7			30										strapping band, 2x stri	47	
40	Hundnset					90					40									500	815	3				10	140					8x plastic bottles, buo	1598	
41	Hundnset																													###		net	60000	
42	Hundnset	79.48.321	11.50.844	21.08.2024	0	90	0	5	0	0	45	0	0	0	0	0	0	0	7	500	815	33	0	0	0	10	140	0	0	###	0		61645	20,54833333
43	Raudjord - Snotinden																																0	
44	Raudjord - Snotinden	79.45.037	11.55.865	21.08.2024	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	0

Documentary movie completed



https://outdoormagazyn.pl/plastic-arctic-kuba-witek/

https://www.youtube.com/watch?v=MiENaZ8mULU

Papers produced from the project:

The spatial distribution of driftwood on Svalbard

Polish Polar Research 2026 in press

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Sopot 81-712, Poland

Abstarct:

The driftwood trajectories derived from a model describing sea ice drift and surface water currents show that 24% of wood logs entering the Arctic Ocean from the rivers of Western Siberia — the Pechora, Ob, and Yenisey — are deposited along the coasts of Svalbard. Satellite-based mapping of driftwood along the entire Svalbard coastline revealed a clustered distribution. The highest concentrations occur on the northern shores of Spitsbergen and Nordaustlandet (32%), as well as along the shores of Prins Karls Forland (24%). The majority of driftwood, measuring 2–6 m in length, is located 20–200 m inland and at elevations of 3–8 m above sea level. River mouths and lagoons play an important role in the local distribution of driftwood. A rough estimate suggests that Svalbard contains between 100,000 and 300,000 driftwood logs

Macroplastic and driftwood on Svalbard – likely correlation

J.M. Węsławski, L. Kotwicki, J. Urbański, A. Herman

Paper in preparation – expected to be published in 2026

Methodology

Coastal sites were visited in August 2023-2025, during low tide. Georeferences were noted on the spot, plus time and place name. Team of two or more observers was walking 100m along the drift line, parallel to the coast on the whole width of the apparent sea level range (drift zone), that may vary from 1m to tens of meters. All macroplastic items, visible from the walking position were collected and photographed as close as to permit its identification. Every case of organisms attached to the plastic was noted, photographed separately. Another photo was taken to present the general view of the examined coast with drift line and next photo to present the intertidal vegetation. Such transect count was repeated if possible two or more times, each time registered as separated macroplastic collection.

In the office photos were analysed for the identification of plastic material, following the classification used in OSPAR recommendations for coastal litter surveys. The number and estimated weight of objects were noted in the summary table.

The driftwood was counted from the satellite photos (MARXAN), methodology was described in detail in published paper (Urbanski 2026).

Results

Correlation of driftwood and macroplastic:

The average mass of plastic was estimated for all examined sites (100m long coast lines) , mean 8.76 kg, mediana 2.07 kg and mean number of objects per 100m transect as 19.6, mediana 12.

Assuming, that plastic occurs where the driftwood was noted (77% of the coastline, or 5986200 m). The plastic weight was estimated for mean values (59862*8.67) and median values (2.07), what makes 519 tonns (median 123 tonns). Number of objects ranges accordingly as 718 mln (mediana) to 1173 mln (mean).

Correlation of macroplastic mass and driftwood (logs number) is presented on Fig. 1 with statistically significant, R=052.

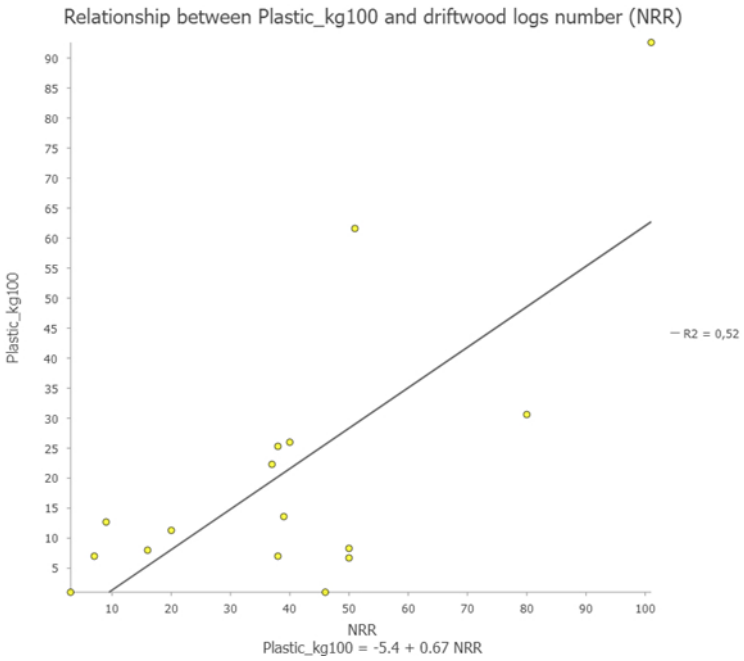

Fig. 2 Driftwood and macroplastic litter

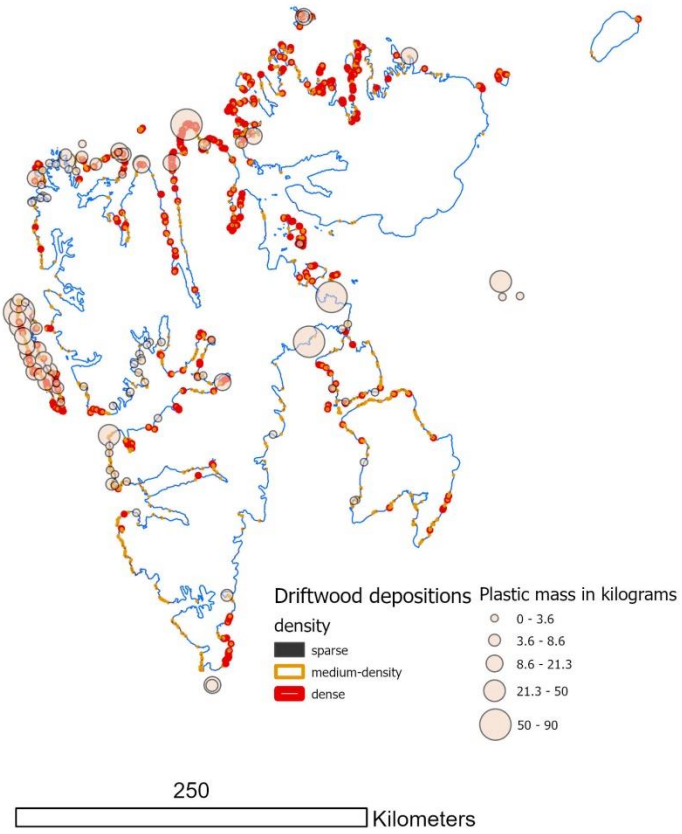

Fig. 3 Potential sites of plastic deposition – modelled after the driftwood analyse

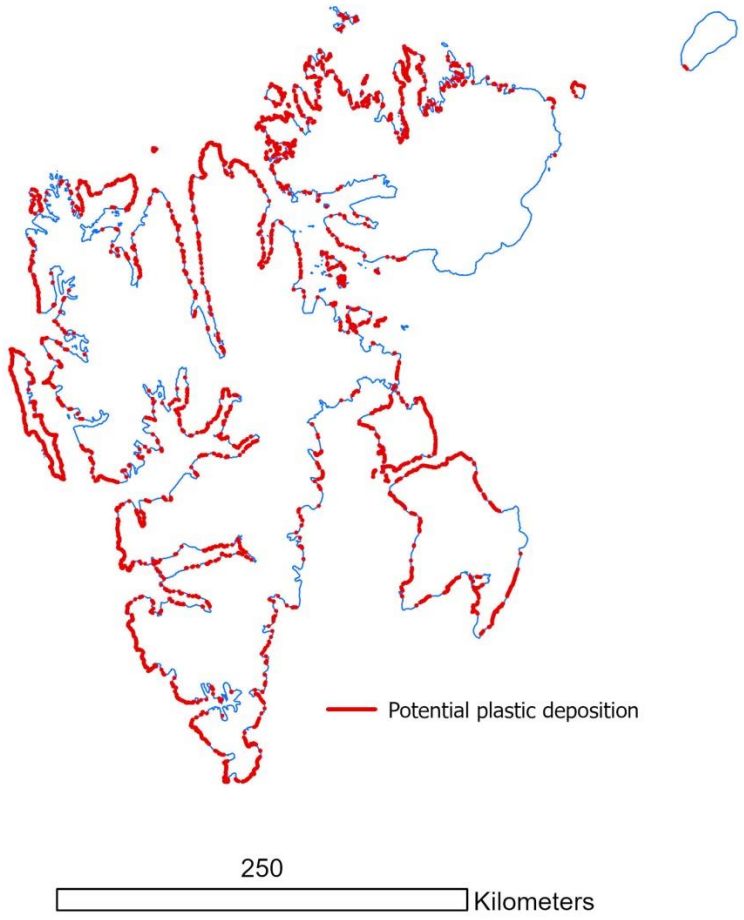

Fig. 3 Comparison of plastic mass versus number of items along Svalbard shores