CMPA Technical Report Series

43

Current Waste Management Practices in Velas, Kelshi and Anjarle villages in coastal Maharashtra, for Conservation and Sustainable Management of Coastal and Marine Protected Areas (CMPA)

by
Sahyadri Nisarga Mitra

February, 2016

Indo-German Biodiversity Programme
Conservation and Sustainable Management of Coastal and Marine Protected Areas

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Disclaimer

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CMPA	Coastal and Marine Protected Area
GIZ	Gesellschaft für Internationale Zusammenarbeit
SNM	Sahyadri Nisarga Mitra
GoI	Government of India
SHG	Self Help Group
PHC	Primary Health Centre

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Chapter 1

Background and objectives

The three study villages, namely Kelshi, Anjarle, and Velas are well-known tourist destinations. The major tourist attraction in these villages is their long, flat, sandy beach. Natural beauty and services provided to tourists are the main assets of any tourism location. A clean surrounding with no filth and litter is important for the aesthetic beauty of a place. In the study villages, at least a third of the population is dependent on tourism. Therefore waste management in the study villages is important not only for aesthetic reasons but also to sustain income generation activities.

In addition, biodiversity conservation is a very important reason to develop systematic waste management in the study villages, especially on the beaches: The study villages have nesting sites of Olive Ridley sea turtles. In fact, the study villages are famous for their proactive conservation efforts for Olive Ridley sea turtles. Together, these three villages have 331 protected turtle nests and have released 12,297 turtle hatchlings over the last 14 years (Sahyadri Nisarga Mitra, 2014).

The study villages are important tourism destinations. Thus, inefficient waste disposal systems directly the affect aesthetic value of the area and could lead to a decrease in the number of tourists and income generated for people dependent on tourism. In the context of marine wildlife conservation in the study villages, waste released into the open sea or creeks remain a serious concern. Thus, waste management is of vital importance for tourism and turtle conservation efforts. In this context, this report is prepared with the following objectives:

- To ascertain sources and nature of waste in the study villages
- To enlist and describe stakeholders in waste management in the study villages
- To determine the rate and volume of waste generated in the study villages
- To provide a baseline for developing guidelines for waste management in the study villages.

1.1 Rural Waste

Waste is any material that has been discarded. Based on its physical properties, waste can be categorised as solid and liquid waste. Solid

Table 1
Categories of rural solid waste

Biodegradable	Non-biodegradable	
It decomposes biologically. For example, kitchen waste, animal dung, agricultural waste etc	It does not decompose biologically	
	Recyclable	Non-recyclable
	It has economic value but is destined for disposal. It can be recovered and reused. For example, plastic, paper, old cloths etc.	It does not have economic value of recovery and includes carbon paper, sanitary napkins and diapers, thermocol etc.

Table 2
Estimates of rural waste generation

SN	Particulars	Value	Unit	Source of Info.
1	Rural population of India	83,30,00,000	persons	Census of India 2011
2	National rural liquid waste generation (grey water)	18,00,00,00,000	lit/day	GoI – MoDW & S, 2012
3	National rural solid waste generation (organic /recyclable)	4,00,000	tonnes/day	GoI – MoDW & S, 2012
4	Per capita rural liquid waste generation (grey water) in India	21.60	lit/day	Calculated from GoI – MoDW & S, 2012
5	Per capita rural solid waste generation (organic /recyclable) in India	0.48	kg/day	Calculated GoI – MoDW & S, 2012

Waste is any waste other than human excreta, urine and waste water, while liquid waste is any used and unwanted water.

Rural solid waste usually comprises of house sweeping, kitchen waste, garden waste, cattle dung and waste from cattle sheds, agro waste, broken glass, metal, waste paper, plastic, clothes, rubber, waste from markets and shopping areas, hotels, etc (GoI, 2012).

In general, rural solid waste can be categorised into two categories: biodegradable and non-biodegradable. The latter includes two sub-categories, recyclable and non-recyclable (Table1).

1.2 Some important aspects of rural waste

1.2.1 Health concern

Waste is a threat to public health. Unplanned waste disposal is a concern for hygiene and cleanliness. Lack of effective waste disposal systems contribute to vector-borne diseases such as diarrhoea, malaria, polio, dengue, cholera, typhoid and water-borne infections. Almost 90% of diseases in rural areas of India are caused by lack of cleanliness and sanitation. Some important implications of the lack of proper waste disposal in rural areas are lack of nutrition, high infant mortality, and increase in school dropouts (ibid.)

1.2.2 Estimates of rural waste

According to government estimates, 18,000 million litres of liquid waste is generated per day in rural areas and 0.4 million tonnes of solid waste are generated per day. Thus, the per capita liquid waste generation per day is 21.6 l/ day and solid waste is 0.48 kg/day (Table 2).

1.2.3 Tourism and waste generation

Tourism and waste generation are closely linked. While mounds of waste in a tourist area can be an eyesore, tourists also contribute to waste

generation in these sites. Mateu-Sbert et al. (2013) worked on Menorca Island in Spain and reported that a 1% increase in the tourist population causes a 0.28% increase in solid waste generation. If this is extrapolated, when the number of tourists visiting a site doubles (100% increase) there will be a 28% increase in solid waste generated. It is thus important that tourist destinations have an effective and sustainable waste management system in place. Similarly, tourists should be sensitised to generate as little waste as possible.

1.2.4 Shoreline debris and coastal villages

Waste, especially solid waste, which enters the marine environment, is called marine debris. Plastic and synthetic materials are the most common types of marine debris. They cause a lot of problems for marine animals and birds (Allsopp et.al, 2006). Marine animals become entangled or ingest marine debris. Most marine debris originate on land. It is reported that about 50 to 80% of sea turtles that are found dead are known to have ingested marine debris.

It is a common sight in Indian coastal villages, including the study villages, to see marine debris such as plastic and synthetic materials, strewn along the shoreline. Usually this debris has its origin in urban places where solid waste landfills are located. Waste from landfills often enters drainage water and sewage, which are released into the sea. This marine debris gradually finds its way back to land along the shore. Thus, coastal villages suffer from debris being deposited on their shoreline by the tides. Shoreline debris is quantified in terms of number or weight per unit length of shoreline (Lippiatt et al, 2006). For example, Jayasiri et al (2013) reported that shoreline debris on Mumbai's beaches ranged between 0.25 and 282.5 items/sq. m (average 11.6 items/sq. m), whereas plastic litter ranged from 0.27 to 15.53 gm/sq. m (average 3.24 gm/sq. m). There is a large knowledge gap about litter on Indian beaches (Vennila et al, 2013).

A different report focuses on existing beach usage and practices in the study villages. Therefore waste and litter on the beach of the study villages is not discussed in this report.

1.2.5 Policy and legislation on waste management [1]

Waste management policy in India is based on three principles: Sustainable development, precaution (measures to avoid environmental degradation and hazards), and polluter pays (the polluter bears the cost for damages and harm caused to the environment by his or her actions). Waste management in India is regulated by Environment Protection Act, 1986 (EPA). Specific rules have been specified for different kinds of waste in the EPA. Important rules include,

Bio-medical Waste (Management and Handling) Rules, 1998: Biomedical waste means any waste generated during healthcare processes like diagnosis, treatment, immunisation of human beings and animals, and research activities concerning production and testing of living beings. These rules provide a detailed framework for effective disposal of biomedical waste.

The Batteries (Management and Handling) Rules, 2001: These rules regulate handling and disposal of used lead acid batteries and their components. They apply to every manufacturer, importer, re-conditioner, assembler, dealer, recycler, auctioneer, bulk consumers, and general consumers.

The E-waste (Management and Handling) Rules, 2011: This deals with regulation of disposal, import, and recycling of e-waste. The E-waste Rules apply to every producer, consumer or bulk consumer involved in the manufacture, sale, purchase, and processing of electrical and electronic equipment or components, along with collection centres, dismantlers, and recyclers.

[1] This section is sourced from Tripathi, A. (2015).

The Plastic Waste (Management and Handling) Rules, 2011: These rules provide regulatory framework for manufacture, usage, and recycling of plastic waste, which refers to any plastic product that has been discarded. The rules apply to all manufacturers, stockists, distributors, retailers and users of plastic products.

The Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008: These rules provide regulation to manage generation, storage, reuse, recycling, import, transportation, and treatment of hazardous waste.

1.3 Ongoing government mission on rural waste and sanitation

Swachh Bharat Mission is a flagship scheme of Government of India that was launched in 2014. It aims to motivate citizens to work towards cleanliness. Under the mission, a fund named Swachh Bharat Kosh (SBK) has been established to collect Corporate Social Responsibility (CSR) funds and contributions from individuals to achieve its objectives.

Chapter 2

Study area description

The study villages are located on India's western coast. They are about 200 kms south of Mumbai city. The study villages have flat beaches. Most people in the villages are engaged in agriculture, such as paddy cultivation as well as plantations for mango, cashew, coconut and betel nut. Secondary sources of income include remittance from youth who have migrated to urban places like Mumbai and Pune. The physical features of the study villages are described below.

Velas is located in Mandangad *taluka* of Ratnagiri district, Maharashtra. It is situated at the northern boundary of the district, near the mouth of Savitri River (17˚57'27.7" N and 73˚01'55.0" E). The beach in Velas is 3 kms long and has emerged as a popular tourist site since 2006, when it started hosting an annual turtle festival. There is an estuary to the north of the beach and the southern end has a rocky patch bordered by natural vegetation and a freshwater stream. Most of the beach is surrounded by Casuarina plantations and Ipomea biloba.

Kelshi is located in Dapoli *taluka* of Ratnagiri district (17˚55'11.4" N and 73˚03'16.5" E). The beach is 2 kms long and includes sandy and rocky sections. The beach is surrounded by Casuarina plantations. There is an estuary to the north of the beach and a broad rocky patch dominated by Indian screw pine (Pandanus sp.) and Ipomea biloba to the south.

Anjarle is located in Dapoli *taluka* of Ratnagiri district (17˚50'47.6" N and 073˚05'20.5" E). The beach stretches for 1.2 kms and is broad but gradually narrows towards the southern end. There is an estuary to the south and a rocky patch to the north. It is flanked by coconut and betel-nut plantations, mango groves, Casuarina plantations, and wild Indian screw pines.

The demography of the study villages is presented in Table 3.

Table 3
Demography of the study villages as per census 2011

Particulars	Velas	Kelshi	Anjarle
Total population	506	3,145	1,394
Male	306	1,472	672
Female	276	1,673	722
Literacy (%)	77	81	83

Figure 1: Geographical location of the study villages

Chapter 3

Methodology

A mix of qualitative and quantitative methods was used to collect data for this research. The qualitative part of the methodology included stakeholder identification for waste management in the study villages and interaction with them on existing practices of waste management. This was facilitated through semi structured interviews, focus-group discussions and participant observation.

The quantitative part of the methodology consisted of measurements and estimation of waste generation in the study villages. The average quantity of solid waste generation of households was estimated through the random selection of 25 households in each study village. These households were requested to store their waste for three days as the amount of waste generated on a daily basis in some households was very low and below the lowest count of the spring balance. The solid waste in each household was collected after three days, segregated into biodegradable and non-biodegradable waste and weighed with a spring balance. This reading was used to estimate the daily solid waste generation. In the case of households providing home-stay facilities, waste generation before and after the peak tourism season was measured.

Tourism peaks in the study villages during certain months and special occasions. Our observations were recorded before and after these peaks. A total of four rounds of measurements were done—two rounds before tourism peaks and two rounds after the peaks that occurred for Diwali and New Year's Eve.

The quantitative estimates were done according to the methodology suggested by Ariza et al (2008) and Israel (1992).

Stakeholders for waste management are individuals or institutions, private or public, with a direct or indirect contribution to generating waste or having an interest or concern in waste management due to various factors, including livelihood, threats to the environment, research, regulation, or commercial use. Stakeholders in waste generation and management in the study villages were identified on the basis of earlier reports by SNM on stakeholders in the study villages, discussion with community members, and SNM members.

Chapter 4

Analysis and discussion

4.1. Stakeholder groups and their role in waste management

It is not feasible to interact with every stakeholder. Therefore, the stakeholders were categorised into 20 broad groups (Table 4). The basis for grouping the stakeholders is their role in waste management—generation (G), disposal (D), transportation (T), sensitisation for responsible, safe and hygienic disposal (S), regulation (R), policy and advocacy (PA) and, community organisation (CO).

Based on the nature of their role, stakeholder groups were further divided into two sub groups; individual/ private and institutions/ public. Individual stakeholder groups play an active role in generation and disposal of waste. Each individual/private stakeholder group, as compared to institutional/public stakeholder groups, generate very small amounts of waste, which are mostly biodegradable. However, since there are large numbers of such individuals/private stakeholder groups in the study villages (Table 5), they cumulatively generate a considerable volume of waste. The non-biodegradable waste is usually packaging material, primarily plastic carry bags as well as thermocol plates, bowls, and plastic spoons used during festivals and functions due to the ease with which they can be disposed. Shops and tourists are a major area of concern as they collectively generate a lot of waste in the form of wrappers, packets and cold drink bottles. A majority of respondents (97%, n=75) in the study villages mentioned that tourism is responsible for littering in the villages. Plastic bags, wrappers, and plastic bottles constitute most of the litter found in villages, which choke natural and man-made drainage systems.

The role of institutional and public stakeholders is not confined to generation and disposal of waste. They play an active role in transportation, regulation and monitoring of compliance of norms and rules, waste disposal by other stakeholder groups, provisioning for waste disposal facilities, sensitisation/awareness generation and community organisation for responsible and safe disposal of waste. Amongst institutional stakeholders, the Gram Panchayat is the most important stakeholder. In the survey, a majority of respondents in all

Table 4
Stakeholder groups in waste management in the study villages and their broader role

SN	Stakeholder Group	Role in waste management						
		G	D	T	S	R	PA	CO
	Individual/private							
1	General households	Y	Y					
2	Households with backyard plantation	Y	Y					
3	Home-stay providers	Y	Y					
4	Fishermen	Y	Y					
5	Casual vendors/general shops	Y	Y					
6	Meat shop	Y	Y					
7	Makeshift eateries (tea shops, snacks etc.)	Y	Y					
8	Restaurants	Y	Y					
9	Hotels with lodging and boarding	Y	Y					
10	Food processing units	Y	Y					
11	Scrap shop	Y	Y	Y				
12	Tourists	Y	Y					
	Institutions/public							
13	Gram Panchayat	Y	Y	Y	Y	Y	Y	Y
14	Biodiversity Management Committee				Y		Y	Y
15	Religious places	Y	Y		Y			Y
16	Educational Institutions	Y	Y		Y			
17	Medical and health	Y	Y		Y			
18	Voluntary /Social organisations				Y		Y	Y
19	Mining and dredging company	Y	Y	Y				
20	Maharashtra State Road Transport Corporation	Y	Y					

G=Generation, D=Disposal, T=Transport, S=Sensitisation of community, R=Regulation, PA=Policy Advocacy, CO=Community Organisation

the villages (71%, n=75) mentioned that Gram Panchayat must perform its role effectively to tackle waste generated by tourists.

Gram Panchayat must provide public dust bins and encourage tourists to use them to dispose waste. Biodiversity Management Committees were established recently in the villages and can play an effective role to sensitise community members and organise various stakeholders for responsible waste disposal. In this context, religious places can also play an effective role to sensitise and organise community members for effective waste management. Schools too can play an important role in sensitising students about waste management practices.

4.2. Waste generation and disposal in the study villages

Our observations on waste generation and disposal practices in the study villages are based on semi-structured interviews of stakeholders and household-level measurements. This data is presented in Tables 6 and 7.

4.3 Waste segregation and disposal

Waste generation by households in the study villages is mostly biodegradable, which is in keeping with the general trend for rural households. Non-biodegradable waste generated by households in the study villages is around 15 to 20% of the total waste generated. Households partially segregated

Table 5
Estimated number of some stakeholder groups in the study villages

SN	Stakeholder Group	Velas	Anjarle	Kelshi
1	General households[2]	161	407	773
2	Home-stay providers	31	25	25
3	Fishermen	0	0	10
4	Schools[3]	3	5	11
5	Religious places	4	4	4
6	Government dispensary	1	1	2
7	Private clinics	2	1	2
8	Casual vendors/shops	3	12	37
9	Food processing units	0	0	2
10	Hotel	0	3	4

[2] As per Census 2011
[3] Ibid.

waste. Traditionally, waste from plantations and kitchen have been composted. Liquid waste from kitchen and bathroom households with plantations are usually released into the plantation and re-used. Households without plantations use the water in kitchen gardens or release it in drainage systems. Current waste management practices in the study villages have been summarised in Table 8.

Sanitary waste such as cloth napkins are generally burnt, while modern napkins and diapers are not commonly used in the study villages.

Non-biodegradable but reusable dry waste, such as plastic containers, are re-used or sold to recyclers. Articles such as plastic bags, multi-layered packaging material are not segregated but burnt. This has a negative environmental effect as burning leads to the release of CFCs into the environment. There are no efficient system to dispose hazardous waste like used batteries, fused bulbs, and tube lights, which are dumped in the compost pits or in open dumps. Non–biodegradable and non-recyclable waste like Styrofoam articles are dumped in roadside ditches, outside the villages or in the creek.

There are two scrap shops Near Kelshi, while there is one in Bankot near Velas. The scrap shops in Kelshi mentioned that they purchase articles that can be recycled, such as plastic and glass bottles. They also buy some electronic wastes like household appliances.

4.4 Biomedical waste

The management of waste by the hospital in Anjarle was poor as it does not have a formal biomedical waste collection system for segregation and transportation of waste. Instead, waste is dumped into an unlined pit in the hospital premises.

We interacted with the Resident Medical Officer (RMO) in Kelshi PHC about biomedical waste management. They maintain a register to record the quantity and other details of biomedical waste. Wet biomedical waste is buried and composted. Most of the dry waste is burnt in the open. No formal information could be obtained from the Velas Government Hospital.

Table 6
Observations on existing waste management practices in the study villages

SN	Particulars	Velas	Kelshi	Anjarle
	Solid waste			
1	Attitude and perceptions towards waste	Waste management was not perceived as an issue	Tourism identified as a challenge for waste management	Tourism identified as a challenge for waste management
2.	Waste generated at household level (Fig. 5)	An average of 0.57 kg/day, which is close to the national average (0.48 kg/day) for rural households.	An average of 0.81 kg/day, which is almost twice the national average (0.48 kg/day) for rural households.	An average of 0.51 kg/day, which is close to the national average (0.48 kg/day) for rural households.
3.	Home-stays in waste generation (Refer Table 7 for details)	There was a slight increase (0.5 – 1.0 kg) in kitchen waste generated from households providing home-stay facilities during peak tourism periods Preference for steel utensils was stated	A home-stay owner said they use Styrofoam cups when unexpectedly high numbers of tourists arrive. Others said they prefer steel utensils. Kitchen waste and plastic caused an increase of about 1 kg in waste generated during tourism.	In home-stays, waste generated during tourist periods increased by about 1 kg, largely due to kitchen waste. Preference for steel utensils was stated
4.	Schools	Paper waste generation is about 15 kg/year. It is sold to the local recycler. Confidential papers are burnt. School surrounding was not littered with wrappers and packagings.	~ 30kg paper waste was generated per year, which was sold bi-annually to recyclers. Confidential papers are burnt. Outside schools, hawkers sell chips, aerated drinks, toffees etc. The school has provided dustbins and students use it. On an average, 1 kg waste in the dustbin contains 43% (0.425 kg) paper waste and 57% (0.575 kg) plastic.	Paper waste was sold to recyclers, while confidential papers were burnt. Outside schools, hawkers sell chips, aerated drinks, toffees etc. School has provided dustbin. Students use it effectively. On an average, 1 kg waste are in the dustbin, which includes 50% (0.5 kg) paper waste and 57% (0.5 kg) plastic.
5.	Hotels	No hotels	During non-tourist seasons, hotels stay shut and generate no waste (as there they have no resident staff). They claimed to use only steel utensils and no Styrofoam.	Hotels were shut during non tourism days, generating waste only during peak periods of tourism.
6.	Temples	High volumes of religious waste, most of which are biodegradable, such as discarded flowers and offerings, are generated during Ganpati festival, Navratri and annual village festivals. Otherwise daily generation is negligible.	High volumes of religious waste, most of which are biodegradable, such as discarded flowers and offerings, are generated during Ganpati festival, Navratri and annual village festivals. Daily generation is significant. On an average, in 1 kg of the daily waste, 94% (0.94 kg) is biodegradable and 1% (0.06 kg) is plastic.	High volumes of religious waste, most of which are biodegradable, such as discarded flowers and offerings, are generated during Ganpati festival, Navratri and annual village festivals. Daily generation is significant. On an average, in 1 kg of the daily waste, 90% (0.90 kg) is biodegradable and 10% (0.1 kg) is plastic.

Table 6
Observations on existing waste management practices in the study villages

SN	Particulars	Velas	Kelshi	Anjarle
7.	Casual vendors/ general shops	There are very small grocery shops. Waste generated was not littered	Waste generated was not littered. Vegetable vendors carried back leftover articles. Packaging was taken by customers. Only chicken offal was disposed as waste and composted. In pre-tourist periods, chicken offal was about 3kg, which nearly doubled during peak tourism periods. Tailors used cloth scraps to make quilts and pillows.	Waste generated was not littered. Vegetable vendors carried back the leftover articles. No dumping of waste was observed. Butchers left chicken offal and feathers for jackals. In the pre-tourist period, chicken offal waste was about 2.5 kg and increasing to about 6.5 kg during peak tourism periods.
8.	Hospitals	There is one government hospital in Veshvi Velas, the ASHA member of this hospital visits Velas to provide medical services on request. There is no medical facility available in the village except for two doctors operating from home.	Waste included used syringes, empty saline bottles, and plastic coverings of different medications. The Kelshi Public Health Centre maintained a biomedical waste register, which we examined. This biomedical waste is supposed to be transported as bio-hazardous waste to Chiplun. Despite initial segregation and the biomedical waste management plan, the waste was dumped behind the hospital in an unlined pit. Waste could not be profiled due to lack of cooperation from the hospital staff.	There was no biomedical waste management plan here and no waste segregation was observed either. Waste was dumped into an unlined pit, and the hospital staffs were unwilling to dig it out for profiling.
9.	Private clinics	Biomedical waste was dumped with household waste with no segregation.	Data not shared	Data not shared
10.	Food processing unit	No food processing unit	One food processing unit, Durga Food Products sells Alphonso mango pulp.	No food processing unit
11.	Open dumping sites	Masjid road Khaadan area Near Zilla Parishad school (by ST Bus staff)	Kinara Mohalla Kumbharwada Paranjape Ali, Near beach, above the high tide line)	Khaadan, Ubha ghar Adi, Beach
	Liquid waste			
12	Toilet sewage in households	72% households have lined septic tanks, 20% *Jirta* (toilets with unlined septic tanks) and 8% homes near the creek area (Danda) drain directly into the creek. Lined septic tanks	64% households have lined septic tanks, 8% have *jirta* and 28% drain directly into the sea	68% households have toilets with lined septic tank and 24% have *jirta* toilets. 8% of the respondents admitted to open defecation
13	Toilet sewage in public toilets	No public toilet.	All public toilets are *jirta*, as per Gram Panchayat discussion	Data not shared.
14	Roadside drainages	Roadside drainages are cleaned once a year	Roadside drainages are cleaned thrice a year.	Clean-up of drainages are irregular

Figure 2: Average waste generation at the household-level

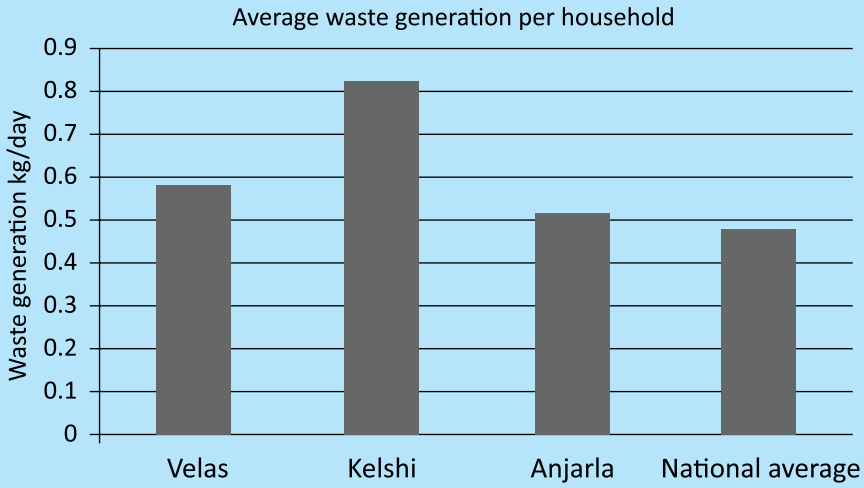

Table 7
Daily solid waste generation at the household-level

SN	Particulars	Velas		Kelshi		Anjarle	
		Avg. Wt. (kg/day)	%	Avg. Wt. (kg/day)	%	Avg. Wt. (kg/day)	%
		(n =25)		(n =25)		(n =25)	
1	**General Households**						
	Kitchen waste	0.660	33.300	0.630	29.971	1.650	64.630
	Garden/agriculture waste	1.320	66.599	1.470	69.933	0.900	35.253
	Plastic	0.002	0.101	0.002	0.095	0.003	0.118
	Total	1.982	100.000	2.102	100.000	2.553	100.000
2	**Home-stay Providers**						
	Pre tourism						
	Kitchen waste	0.500	12.484	0.500	14.265	0.500	12.484
	Garden/agriculture waste	3.500	87.391	3.000	85.592	3.500	87.391
	Plastic	0.005	0.125	0.005	0.143	0.005	0.125
	Total	4.005	100.000	3.505	100.000	4.005	100.000
	During tourism						
	Kitchen waste	1.000	22.193	1.000	22.212	1.500	29.928
	Garden/agriculture waste	3.501	77.696	3.001	66.659	3.501	69.852
	Plastic	0.005	0.111	0.501	11.128	0.011	0.219
	Total	4.506	100.000	4.502	100.000	5.012	100.000

Table 8
Existing Waste management practices

Practice	Type of Waste
Reusing	Plastic containers
	Fishing nets
Composting	Garden Litter
	Kitchen Waste
	Chicken offal
Sold to recycler	Auto scrap
	Paper
	PET bottles
	PVC
	Metal scrap
Regular open burning in homes	Plastic Bags
	Multi-layer plastic material
	Sanitary waste
Open dumping followed by open burning, though irregularly	Styrofoam cups
	Multi-layer plastic material
	Paper plates
Open dumping	Electronic Waste
	Hazardous Waste like fused bulbs and CRTs
Burying in unlined pits	Biomedical Waste
Open dumping in creek	All types of waste, except recyclables

The ST bus staff that stay in Velas require a proper toilet, staying facility, and dustbins to dispose waste generated while cleaning the bus.

4.5 Pollution due to mining around the study villages

Velas and Kelshi have leased mining areas in their neighbourhood, such as opencast mining in Velas Sakhari and the opencast bauxite mining in Umbarshet and Kavdoli near Kelshi. Transportation of excavated material is done by uncovered dumper trucks that pass through the study villages. Dust and suspended particulate matter are quite high in Kelshi. Further investigation is required for this issue.

Chapter 5

Follow up

This report has provided information on existing waste management practices in the study villages. It has described all major stakeholders—individual/private and institutional/public in the study villages and their role in waste management. It also details the volume of solid waste generated at the household-level. Similarly, SNM has earlier documented sand and biodiversity profiles of the beach in the study villages. Based on this knowledge, it is possible to prepare beach management guidelines with clearly roles, responsibilities, and timeframes for action for all stakeholders. This report provides inputs for developing beach management for the study villages and other coastal villages with marine turtle nesting sites.

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Photos

Photo 1: Household survey

Photo 2: Burning of agricultural waste

Photo 3: Hawkers outside a school

Photo 4: Burning of leaf litter

Photo 5: Temple waste

Photo 6: Waste discarded in open dump

Photo 7: Burning of plastic waste

Photo 8: Electronic waste

Photo 9: Grocery shop in Velas

Photo 10: Scrap shop yard near Kelshi

Photo 11: Village drainage cum natural stream

Photo 12: A page from the record register for biomedical waste in Kelshi

Annexure 1: Research Team

1.	Ramashish Joshi, SNM, Chiplun.
2.	Raghunandan Velankar, SNM, Chiplun
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6.	Adwait Jadhav, TerraNero Enterprises, Mumbai.
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8.	Aditi Srivastava, TerraNero Enterprises, Mumbai.

Annexure 2: List of resource persons

Velas	Mr. Omkar Prakash Nijsure	Home-stay operator
	Mr. Ravindra Dhondu Pawar	Cable operator as well as electronics repairing
	Mr. Mohan Upadhye	Farmer and project employee, GIZ-Maharashtra State Forest Department CMPA project
Kelshi	Dr. Shubhada Gawade	Private Doctor
	Mr. Ehsan Khan	Local scrap shop owner
	Mr. Bharat Kitabu Basphod	Local scrap shop owner
	Dr. Vinita Kangule	Medical officer on duty (Public Health Centre, Kelshi)
	Mr. Trushant Bhatkar	Home-stay operator and Vice Sarpanch
	Mr. Uday Joshi	Horticulturist and entrepreneur
Anjarle	Dr. Shripad Biwalkar	Private doctor
	Mr. Malgunkar	Chicken shop owner
	Mr. Abhinay Kelaskar	Farmer and project employee, GIZ-Maharashtra State Forest Department CMPA project

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