



Invasive Alien Species (IAS) Awareness Baseline Survey, Saint Lucia, 2010

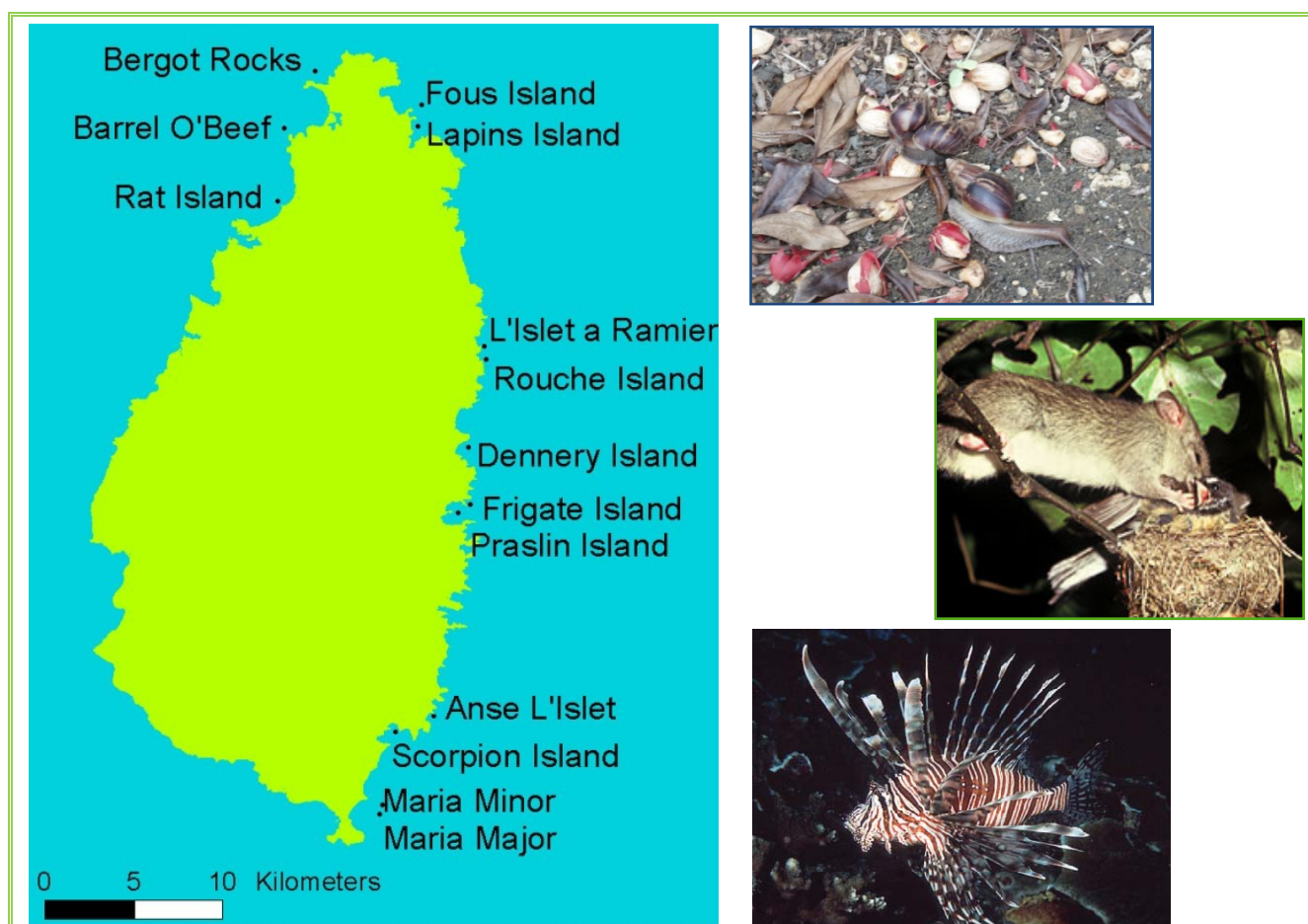
carried out in support of the Critical Situation Analysis (CSA) under the project

Mitigating the Threats of Invasive Alien Species in the Insular Caribbean

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Executive Summary

This awareness survey on issues related to invasive alien species (IAS) in St. Lucia aimed to establish a baseline that could inform the strategic approach of a public awareness campaign as well as provide a basis against which the success of such interventions could be assessed. A general, island-wide and two pilot site-specific questionnaires (for 50 respondents each) were elaborated and used as guidance for pairs of interviewers, who were instructed to encourage a free flow of opinions from 505 respondents, who were randomly selected from the general public in all Forestry Ranges. Data were categorized and analyzed by χ^2 -analysis in order to arrive at strategic recommendation for environmental education. Methodological recommendations for follow-up surveys are also presented. Overall the survey appears to be representative of the St. Lucian public, but backstopping against the 2010 National Census is recommended for future fine-tuning.

Despite clear evidence of on-going environmental education having an impact, the understanding of biodiversity issues remains rather limited and largely restricted to the better-educated professionals. Therefore, as a foundation to the public education campaign, the fundamental concepts of biodiversity should be reinforced. Cultivated species that have been introduced several generations ago were frequently and incorrectly viewed as indigenous to St. Lucia, including some highly invasive species, such as water hyacinth (*Eichhornia crassipes*). This widespread misconception needs addressing systematically and suitable case-study species (plant and animals) for terrestrial and aquatic ecosystems are suggested.

A case in hand is the alien iguana, which was regularly and explicitly flagged as native. Awareness of two geographically separate iguana populations and the implication for management seems to be negligible. It cannot be assumed that the meanings of the terms “native” or “alien” are generally understood. These basic concepts, particularly the potential effects of the alien iguana, need to be communicated with clarity and objectivity to avoid fuelling poorly rationalized fears. On the other hand, observations contributed by a well-informed subset of Soufriere respondents, who clearly have benefitted from the groundwork done by the on-going alien iguana eradication programme there, strongly suggest that initial escapes of captive iguanas must have happened well over a decade ago. The lesson learnt in Soufriere could serve as a trusted example to illustrate the risks of holding potentially invasive animals in captivity to the wider public. The Soufriere experience could instruct the formal and informal pet trade, which enjoys growing popularity in the north of the island.

Deforestation was the most frequently mentioned threat to terrestrial biodiversity, followed by garbage, chemicals and pollution, three threats that coincided with the freshwater threats of greatest concern. The top three perceived threats to marine biodiversity were garbage, pollutions and oil spills. IAS ranked 18th as a perceived threat to terrestrial biodiversity and 21st as a marine threat; they did not feature at all in perceptions of freshwater threats. None of the respondents regarded IAS among the top two threats to marine biodiversity. Clearly, the current ranking of IAS as a threat to terrestrial and aquatic ecosystems needs to be improved with the aim of a widespread appreciation of IAS being the second most important threat to biodiversity (after habitat loss) across all ecosystems. Awareness on freshwater ecosystems is furthest behind at present.

The IAS public education campaign should build its programme around a solid conceptualization of IAS, their effects and dynamics, as this seems to be the missing link in fragmented but punctually quite accurate and often rather detailed baseline awareness. Many St. Lucians named one or more IAS, which they were familiar with, often through agriculture. Fewer were aware of the impact on biodiversity, especially in Soufriere, where general IAS awareness was relatively high. Respondents cross St. Lucia were well-aware of humans as the main vectors for terrestrial IAS, via

both deliberate and accidental introduction. In contrast, sea and air currents were held responsible for most introductions of aquatic IAS. Thus, human involvement in the introduction of aquatic species (freshwater and marine) will require clarification. Not surprisingly, baseline awareness of the Pacific lionfish, which has spread through the northern and western Caribbean to date, was low. However, there was widespread concern about the potential threat posed by lionfish to St. Lucian native fish and other biodiversity, as well as human health. This indicates fertile grounds for a public education campaign, also on still absent IAS – a prerequisite to encourage behavioural changes in favour of preventing IAS introduction and spread.

There was significant baseline awareness of the importance of St. Lucia's off-shore islands for the survival of certain plant and animal species among respondents in the Vieux Fort area. This should be reinforced by stressing the importance of keeping the islands predator-free and rolled out nationwide. Baseline knowledge seems sufficient to combine this with an introduction to the concept of meta-populations. Once these elements connect logically in the mind of the general public, citizens are likely to head warning against re-introductions of rats or mongooses to off-shore islands, as the key role of humans as vector (deliberate and accidental) is relatively well-understood. Thus, the country is ready for concrete, practical guidelines on how to avoid carrying predators back onto off-shore islands.

In general St. Lucians appeared very open to the destruction of existing IAS and to collaboration with authorities for IAS management. Some respondents, particularly in the Soufriere area, expressed a preference for invasive animals to be taken into captivity. As stated above, the risks of such an approach need to be disseminated. Overall, there is a highly constructive public attitude that should be cultivated by a transparent information policy.

Television, radio and internet were the most important information sources for environmental issues in St. Lucia and should all be employed by a multimedia campaign. Television enjoys the widest audience so that IAS television programmes should be designed to have general appeal. Radio is most suitable to reach the mature generation and should lean towards traditional values. Local radio stations could be instrumental in disseminating pilot-specific information in a targeted manner. While students ranged somewhat above national average for awareness on general biodiversity, their incipient concepts of IAS issues were disappointingly below national average. Education programmes for schools and colleges should make extensive use of the internet in order to reach this target group, together with their teachers. A recent knowledge, awareness and practices (KAP) survey on environmental awareness in relation to protected areas in the Organization of Eastern Caribbean States (OECS) indicated that St. Lucia compares well with other OECS countries. Thus, St. Lucia should strive for a leadership role in raising sub-regional awareness on IAS issues and share the lessons learnt from this current project.

Context and Objectives

St. Lucia is one of five insular Caribbean states - and the only OECS country – participating in a GEF-funded regional project “*Mitigating the Threat of Invasive Alien Species (IAS) in the Insular Caribbean*”, which initiated activities in St. Lucia in October 2009. The multi-sectoral nature of IAS issues demands the involvement of governmental and nongovernmental agencies, as well as a broad range of stakeholders from the private sector and general public. There is little awareness of IAS beyond the agriculture and trade sectors. Participating countries unanimously recognised a need to raise public awareness, as many sectors that regularly interface with IAS are oblivious to

the problem. All participating countries are required to collate baselines studies on the biophysical as well as educational *status quo* at the beginning of the project so that progress can be quantified.

Furthermore, this island-wide survey in St. Lucia aimed to identify areas where public awareness-raising and training are most needed, so that tailor-made programmes and curricula can be designed and implemented with the help of this project. Repeat surveys at key project stages will not only measure the success of such interventions, but also assist in fine-tuning future awareness-raising activities.

Methodology

Preparation

Three questionnaires were designed in a participatory manner with inputs from the IAS Working Group and Central Statistics Department. The final version used is shown in Appendix 1. The first, general questionnaire aimed to gather information on general aspects of biodiversity in terrestrial and aquatic ecosystems, threats to this biodiversity, the perceived role of Invasive Alien Species (IAS) in relation to threats to biodiversity, attitudes towards possible IAS pathways of entry and spread, as well as management options. This questionnaire was used island-wide. The two other questionnaires focussed on the areas and topics surrounding the pilot sites (Appendix 1) and were employed only there, in addition to the general questionnaire.

Two training workshops preceded the awareness survey. Their participants are listed in Appendix 2. During the first training session, the questionnaires were revised with the candidate enumerators. Several modifications were suggested to render the language more accessible. Standardized terminology to translate questions into Kwéyòl, if needed, was decided.

Interviewing

Trained Interviewers worked in pairs: one acting as Interfacer and one as Scribe. Both were in possession of a copy of the relevant questionnaire(s), which were not shown to the Interviewees. The Interfacer was the only one who talked to the Interviewee, guided by the questionnaire copy, which, as can be seen in Appendix 1, contained methodological directives. Only fluent Kwéyòl speaker qualified for the role as Interfacer. However, all Scribes were also fully competent in Kwéyòl.

Respondents were selected randomly, mostly in publicly accessible places, throughout the course of working days. The Interfacer encouraged the respondent to talk freely, while the Scribe assigned certain answers to certain categories and filled in the questionnaires. If for some reason a question was not asked or not answered, “not asked” or “not answered” was recorded.

The Interfacer initiated the interview by greeting the Interviewee and introduced the purpose of the survey, without drawing attention to Invasive Alien Species in the opening. The information that was shared with the Interviewee can be found in the Preamble in Appendix 1. It was stressed that personal information and opinions will be kept confidential and that only processed data would be shared.

Data processing

Data processing involved four steps as outlined below:

Quality Assurance

Quality assurance was a substantial part of data processing. It involved a data entry review, error correction, and the elimination of synonyms, incl. standardization of use of the English or Kwéyòl term. For plant names, the website www.saintlucianplants.com was used as authoritative guide. However, while this website is very accurate for the Kwéyòl name, locally recognized English names are less complete, and internet searches complemented this information when required.

Categorisation

Responses to open questions were categorized as far as possible. This, invariably, involved some subjective calls; i.e. the demarcation between pollution, chemicals, agrochemical use and poor agricultural practices was not always clear-cut. Similarly, the transition from deforestation to erosion and sedimentation/siltation was a gradual one and on occasions two terms were mentioned together, even flagging the causal relationship. The guiding principle during categorization was always to try and reflect what the respondent wanted to express, independent of how skilful he/she was in that attempt. For example, a St. Lucian saying “dolphin” invariably means dorado (dowad) or mahi-mahi, but never the mammal, which would be called “machwen”.

Three individual IAS examples mentioned as threats to ecosystems were categorized as “IAS”: alien iguanas, GAS, and exotic pets. For other potential IAS, such as dogs and pigs, the feral status was not clear from the answers received, and they were listed individually.

Numerical analysis

The numerical analysis involved descriptive statistics, frequency distributions, and contingency tables with χ^2 -analysis, as appropriate on InfoStat (InfoStat, 2004). Uncommon answers were occasionally pooled into “others”. This prevented distraction by rare views and also eliminated most of the obvious misunderstandings, such as the mention of “vehicular accidents” and “crime” as threats to terrestrial biodiversity. (

Interpretation

Graphs or tables were chosen to illustrate common opinions and significant effects (error probability $P < 0.05$). These are accompanied by a narrative that develops concrete recommendations regarding (1) public education priorities and (2) approach for the planned awareness campaign.

There is evidence that some respondents did not understand certain question well or did not pay attention to what their answer actually expressed. For example, when asked to name local land species, several explicitly mentioned the alien iguana. Recurrent misunderstandings were observed only for question C4-4 (Appendix 1), and a recommendation for its re-phrasing in follow-up surveys is presented.

Results and Discussion

Demographics of respondent population

A total of 505 completed general questionnaires were returned. Fifty pilot site questionnaires were returned for the Soufriere area and 51 for the Vieux Fort area, in addition to the general questionnaires, which were also completed there. Table 1 shows the distribution of returned questionnaires across ranges, as served by Forestry Range Officers, and by gender. The densely populated town of Castries and Gros Islet were recorded separately from the less urbanised Northern Range. For some analysis, in which the comparison of pilot sites with the rest of the country was more relevant than an equitable comparison of all venues, Castries, Dennery, Gros Islet, Millet and the Northern Range were pooled (Table 1). The gender distribution between the two pilot venues and the rest of the country did not differ ($P = 0.267$).

Table 1: Geographic distribution of completed questionnaires by gender across the Forestry Ranges of Saint Lucia

Location		Gender			
General Location	Venue	Female	Male	No data	Total
Rest of country	Castries	29	35	6	70
	Dennery	24	35	0	59
	Gros Islet	37	25	8	70
	Millet	38	31	0	69
	North Range	65	68	3	136
C4 Pilot Site VF	Vieux Fort	33	17	1	51
C5 Pilot Site Souf	Soufriere	27	21	2	50
	Total	253	232	20	505
	% of recorded	52	48		100

Table 2 shows the age distribution of respondents by gender. There were significant differences of gender distribution across age groups ($P < 0.001$). Females predominated up to 39 years of age, whereas males predominated in the age groups from 40 years upwards (Table 2). However, the gender by age group distribution between the two pilot venues and the rest of the country did not differ ($P = 0.267$; data not tabulated).

The gender and age distribution was consistently representative for the nation as a whole. The two pilot sites did not differ from the rest of the country for gender ($P = 0.227$) or age group ($P = 0.327$).

The distribution of job level by respondent gender differed significantly ($P < 0.001$) in this survey. Table 3 suggests that men predominate in manual jobs, while women are more frequently employed in technical and clerical jobs. The job level also differed significantly ($P = 0.045$) between pilot venues and the rest of the country. While the χ^2 -test is not suitable to pinpoint the origin of such differences with certainty, it appears that a higher proportion of academics and managers was

interviewed in Soufriere and of unemployed people in the Vieux Fort area, both at the expense of manual labour. In Soufriere, more teachers were interviewed that one would instinctively expect to adequately represent the population of this zone.

Table 2: Age and gender distribution of respondents to general questionnaire.

Age Group	Gender			Total
	Female	Male	No data	
<20	51	30	5	86
20-39	123	87	7	217
40-59	64	86	4	154
>60	10	20	1	31
no data	5	9	3	17
Total	253	232	20	505

Table 3: Job level distribution (%) of respondents to general questionnaire by gender and general location.

Job level	Gender (%)			General Location (%)		
	Female	Male	No data	Rest of country	C4 Pilot Site VF	C5 Pilot Site Souf
Academic/Mgmt	15	15	10	14	12	26
Self-employed	4	2	5	3	2	4
Technical/Clerical	24	13	35	18	18	30
Manual	24	42	15	34	27	22
Student	14	9	30	13	12	4
Retired	2	3	0	2	0	2
Unemployed	14	13	5	13	24	6
No data	3	3	0	2	6	6
Total	100	100	100	100	100	100

Once the results of the 2010 National Census becomes available, the numbers in this section should be compared with the general population to test how representative the demographic distributions of respondents to this survey are compared to the national household average. If needed, adjustments should be made to follow-up IAS surveys.

Choice of information sources on environmental issues

Overall, television reached the largest number of respondents, followed by radio, and the internet. Print media, interpersonal exchange, school/college and other sources (incl. books) were of lesser importance (Figure 1). Although overall in place three, the internet was the favourite source of environmental information for more people than the radio, coming second in this category, while the radio was the majority's second most important choice for environmental information. The distribution for the most popular information source did not differ significantly ($P = 0.229$) from the totality of information sources named. Thus several secondary analyses were conducted for the first choice of information source only to represent environmental information sources in general.

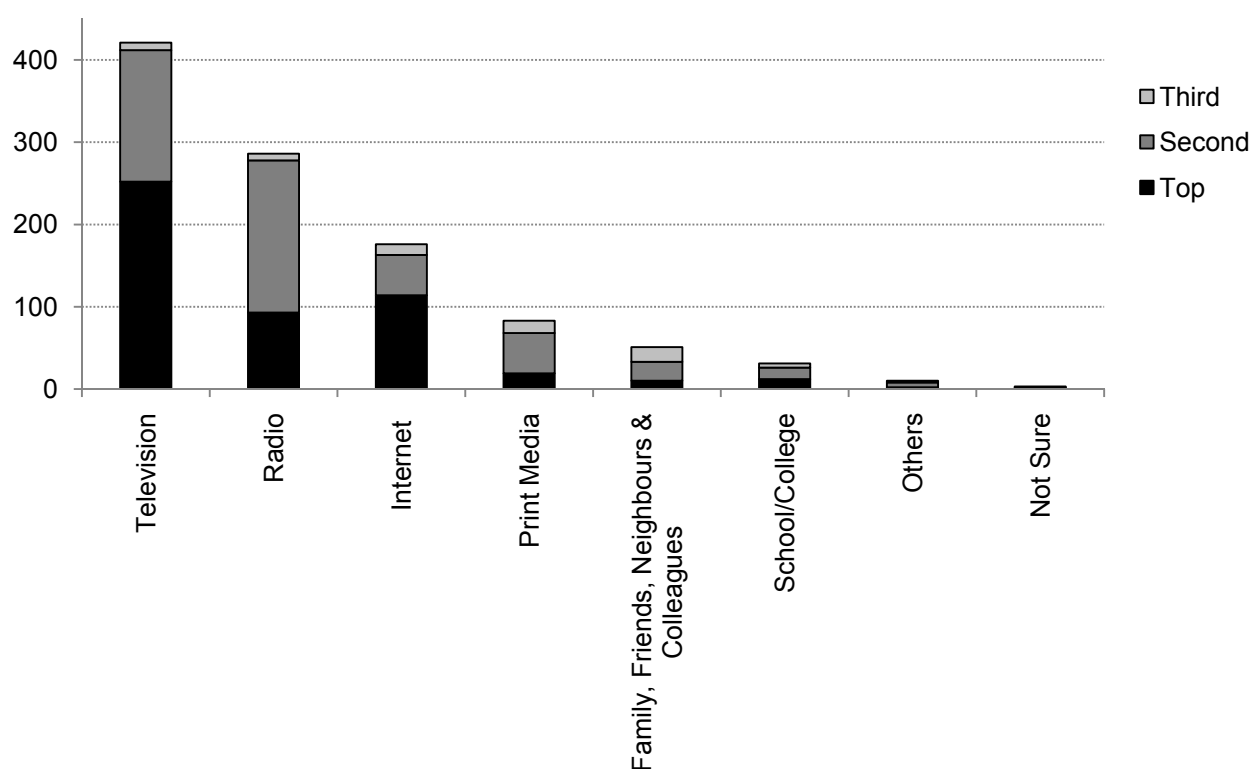


Figure 1: Total count of information sources named as first, second and third choice across St. Lucia.

The first choice of information source did not depend on gender ($P = 0.456$), but varied significantly with age group and job level (both $P < 0.001$). As shown in Figure 2, the television remained the most popular information source across all age groups. For the over 60-year-olds, television tied with the radio. For the 20-39 year-olds, the internet overtook the radio in importance.

The dominance of television as main information source also applied to job levels. Students, followed by academics/managers, technical and clerical staff frequently use the internet, where as the radio was preferred by the retired, followed by the self-employed and then the manual labourers (data not shown).

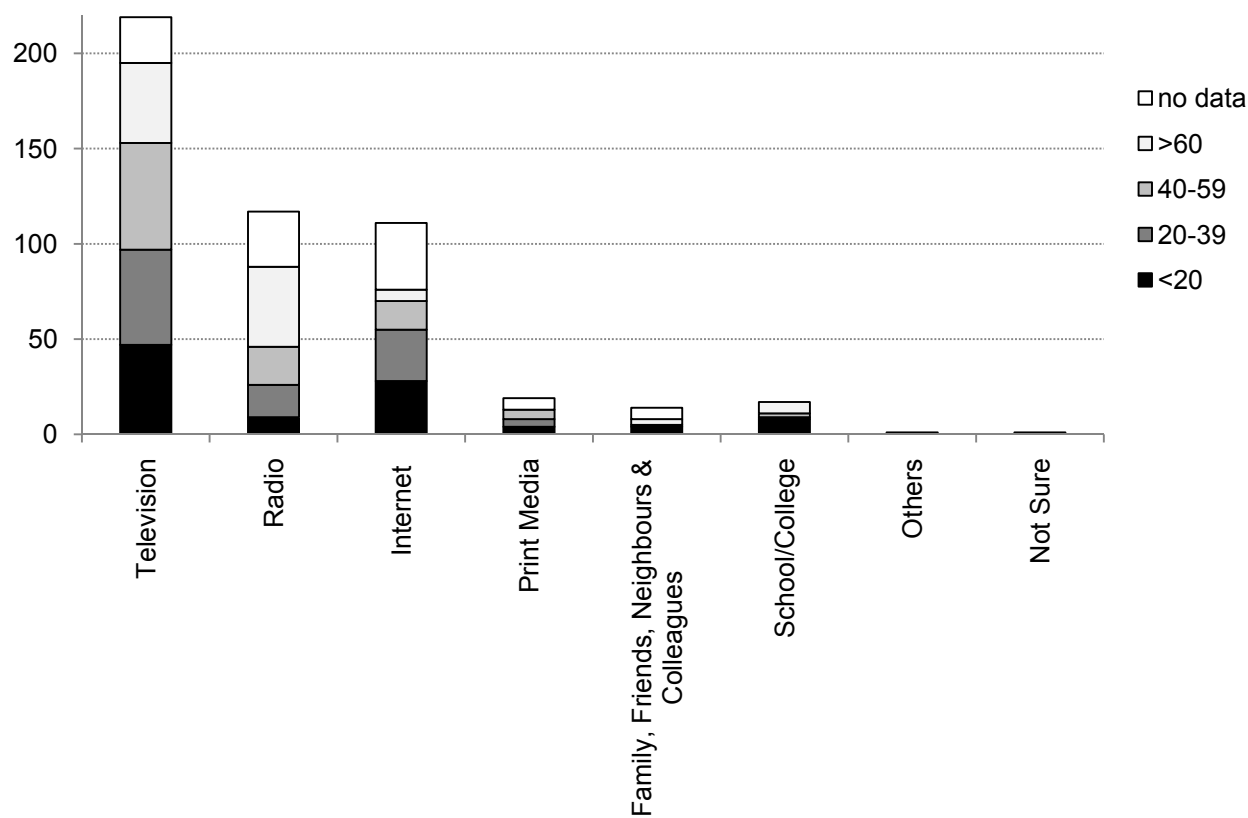


Figure 2: Choice of main information source on environmental issues according to age group of the respondents.

When comparing the pilot sites with the rest of the country, the dominance of television as main information source was maintained, although radio tied with television as 32% in the Soufriere area (Figure 3). This could be particularly useful for disseminating information relevant to the C5 pilot project, but possibly of less interest elsewhere. Recently two local radio stations opened to serve the larger Soufriere Community: LIVE 95 and Soufriere Community Radio Station. At the national level and in the Vieux Fort (Component 4 pilot) area, the internet was preferred to the radio as top information source ($P = 0.002$).

In most parts of the country and in the Vieux Fort area, the radio was the second information source of choice, whereas in Soufriere, the television held this position. On third place, the radio was dominant in Vieux Fort, where school/college and books were also used (Figure 3). Our results generally agree with those of St. Marthe (2003) and Chambers & Smith (2007), who also found television and radio to be the favoured sources of information on biodiversity in St. Lucia. The latter study furthermore suggested that local television stations are preferred to regional ones and that differences existed throughout the course of the day: whereas radio was popular during the morning hours, television became more important in the evenings. In contrast to the present survey, Chambers and Smith (2007) did not rate the internet a very effective information source in St. Lucia. This could represent a recent shift in usage, but may also be partly due to the different survey methodologies employed.

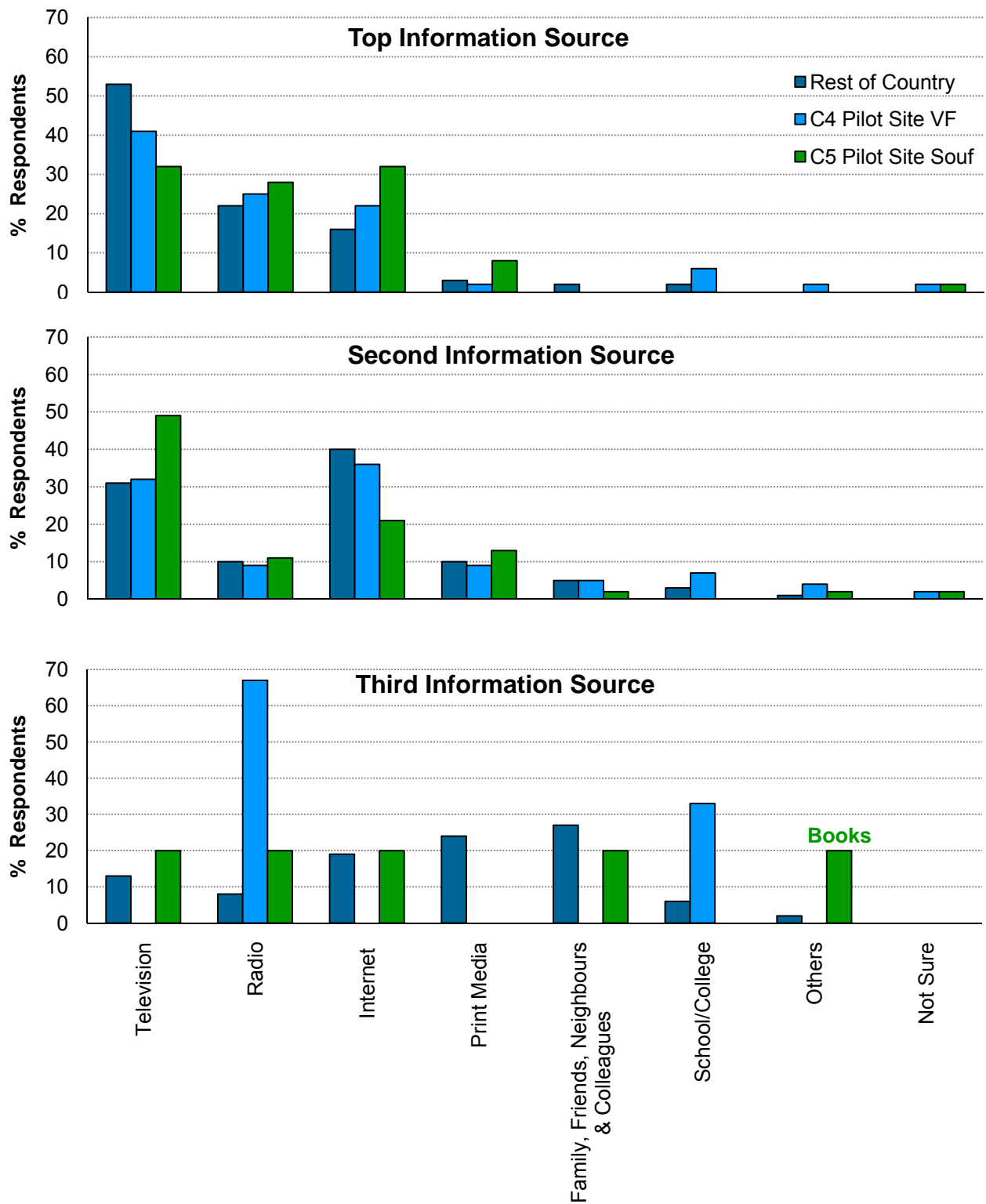


Figure 3: Top three sources of information on environmental issues at pilot sites and in the rest of the country (as %).

Baseline awareness of biodiversity issues

Familiarity with the concept of biodiversity

A total of 64% of the respondent population had heard the term “biodiversity”; 34% stated they had not, while 1% did not answer that questions and 1% of data are missing for unidentified reasons. This distribution was the same at the pilot sites and the rest of the country ($P = 0.627$). At higher resolution, however, geographic differences were highly significant ($P < 0.001$). People in Castries were most familiar with the term “biodiversity”, followed by Gros Islet. The rural Millet and Northern Range exhibited the lowest level of familiarity with this term. Age group had no effect ($P = 0.327$), but job level did ($P < 0.001$). Technical/clerical staff were most familiar with biodiversity, followed by academics/management and then students. The self-employed had the lowest level of familiarity with biodiversity (data not illustrated). St. Marthe (2003) had previously found levels of familiarity with term biodiversity increase together with the level of education.

Of those who had heard the term “biodiversity”, 36% could give a reasonably accurate definition in their own words, while 37% did not know what biodiversity was, and 3% said they knew but could not explain. A further 16% had some approximate concept of biodiversity. This distribution differed significantly between the pilot sites and the rest of the country ($P < 0.001$). In the Vieux Fort area, knowledge of biodiversity was far vaguer than in other parts of the country (Figure 4).

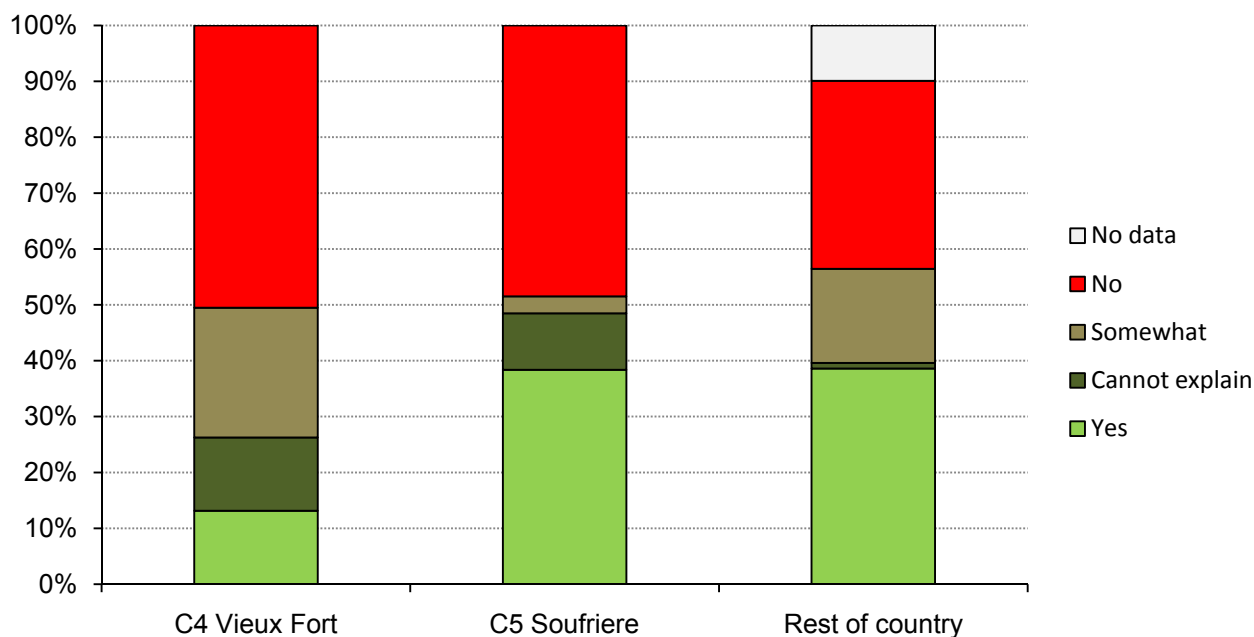


Figure 4: Level of understanding what biodiversity is according to general location.

The percentage of respondents who had heard the term biodiversity in the current survey (64%) was higher than that reported by St. Marthe in 2003 (45%). Furthermore, the percentage of those who had heard the term, who also had a fair concept of biodiversity increased from under 25% to 36%. While this indicates progress towards public education on biodiversity, a large proportion of

the general public still has distorted or vague views of biodiversity, which will require sustained efforts in public education to create a solid foundation for the understanding of more complex concepts. It is noteworthy, however, that within the OECS, St. Lucia was rated as the country with the highest level of environmental awareness (Chambers & Smith, 2007), which put St. Lucia in a key position to champion environmental education in the OECS.

Perceived threats to St. Lucian biodiversity

Deforestation was the most frequently mentioned threat to terrestrial biodiversity, followed by garbage, chemicals and pollution (Figure 5). The latter two could not always be clearly demarcated during categorization. Plastic waste in particular was mentioned so many times across ecosystems that it was given a separate category from general garbage. Invasive Alien Species (IAS), a category pooled from several examples, ranked 18th, with only 0.6% of respondents perceiving IAS at top threat, nobody as second terrestrial threat and 0.4% in third place.

These results are in broad agreement with previous surveys. St. Marthe (2003) reported 98% of St. Lucians to consider forests are very important. Similarly, John (2001) in a survey on attitudes towards wildlife and hunting, reported 70% of St. Lucians to consider wildlife conservation as a national priority. Both surveys indicated awareness and concern about species becoming scarce or disappearing.

The top three perceived threats to marine biodiversity were garbage, pollutions and oil spills (Figure 6). The survey was done during the massive oil spill following the explosion and sinking of a British Petroleum platform in the Gulf of Mexico. IAS as a marine threat ranked 21st. None of the respondents regarded IAS as top or second most important threat to marine biodiversity; 0.6% saw it in third place. Perceived freshwater threats were dominated by chemicals, garbage and pollution (Figure 7). IAS were not mentioned as a freshwater threat.

In an OECS-wide survey, IAS (across ecosystems) ranked 20th, with 27% of households in St. Lucia rating IAS an important threat to the environment. However, in that study respondents were given 20 options and had to decide which ones they regarded important (Chamber & Smith, 2007), whereas we did not provide any such prompts in the present survey. Thus Chambers & Smith present relatively high degrees of agreement to suggested answers that are not directly comparable to our results. Nevertheless, the 27% reported for St. Lucia was the lowest percentage in the OECS; other countries surveyed exhibited “important” ratings for IAS consistently exceeding 40%, except Grenada, where the threat posed by IAS was not recognized at the household level. It will be the aim of the public education campaign to improve these rankings for IAS. It is widely believed that IAS constitute the second (to habitat destruction) most important threat to biodiversity across ecosystems (Secretariat of the Convention on Biological Diversity, 2001). The total numbers of respondents mentioning IAS were too low to conduct further analysis (χ^2 expectation below 5.0), but this should be done once these figures increase.

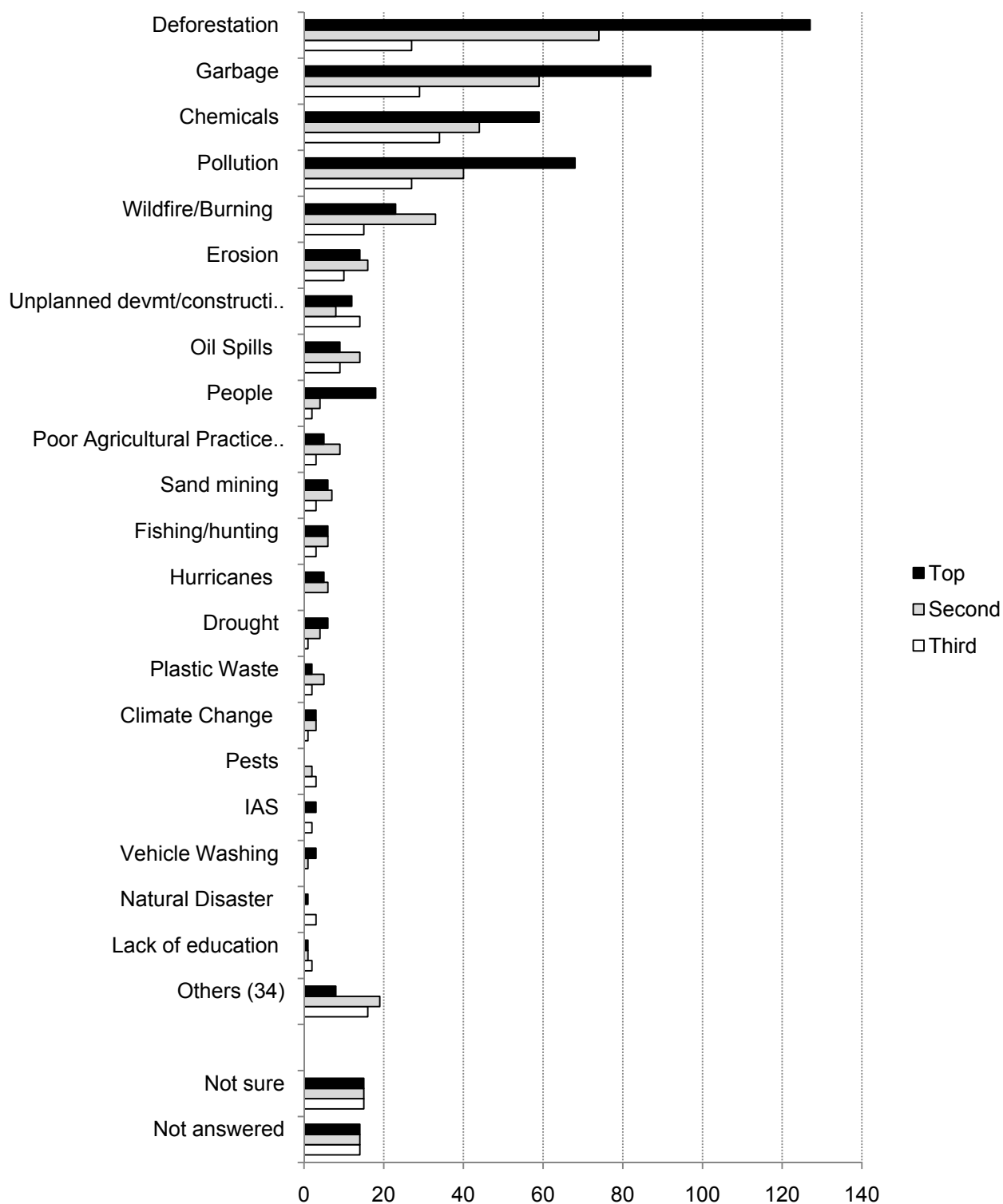


Figure 5: Perceived threats to terrestrial biodiversity in St. Lucia in 2010 (number of respondents out of 505).

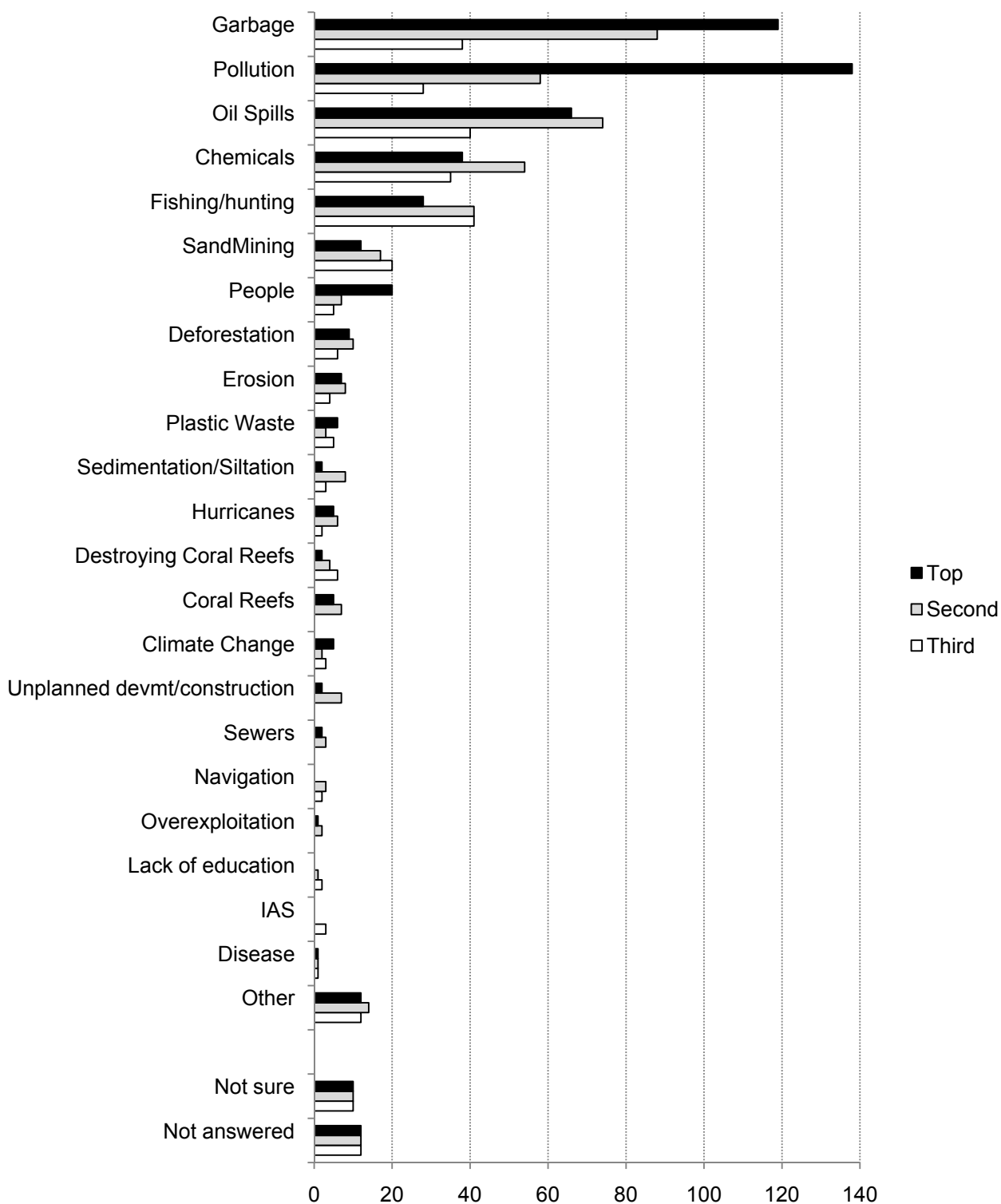


Figure 6: Perceived threats to marine biodiversity in St. Lucia in 2010 (number of respondents out of 505).

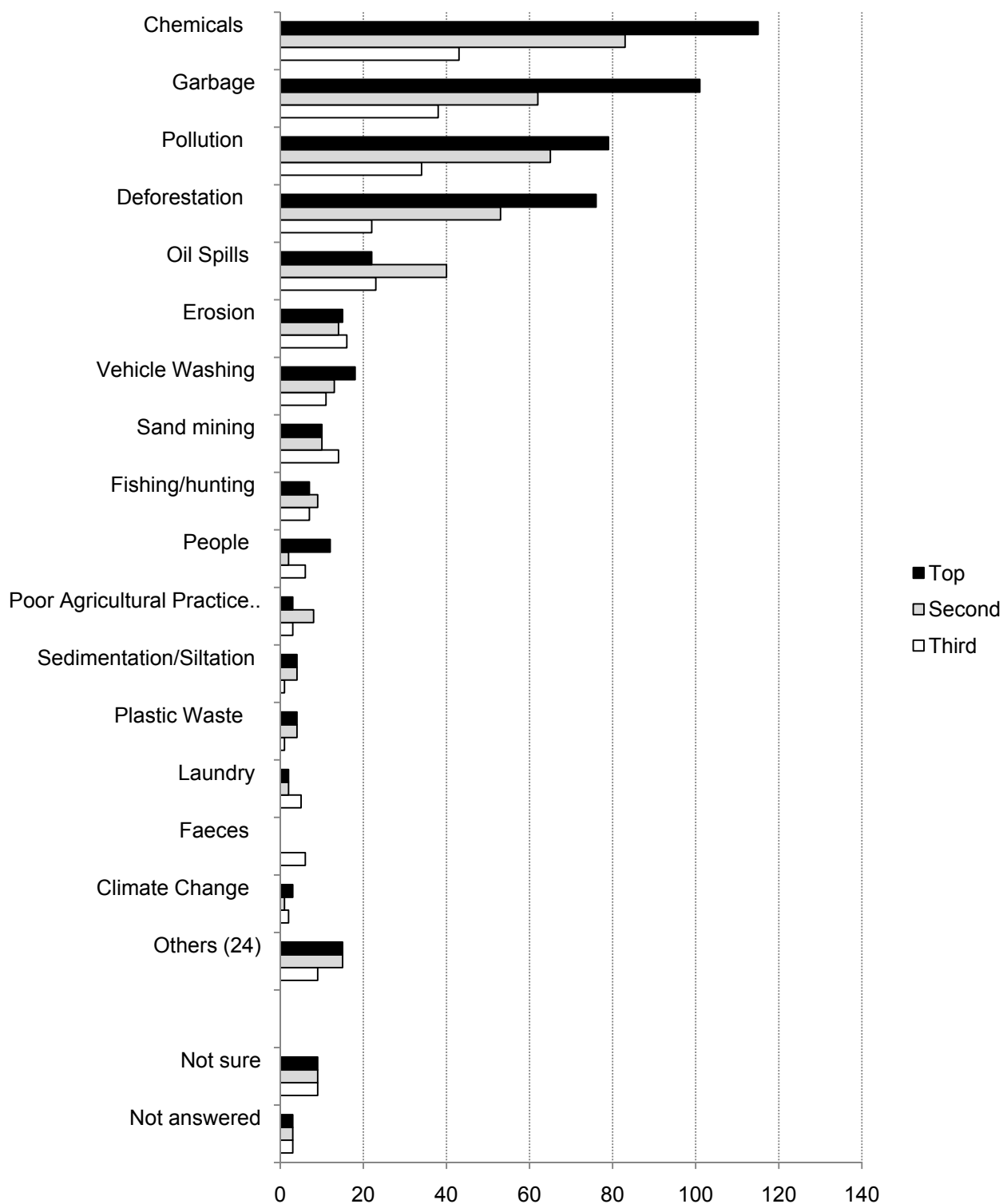


Figure 7: Perceived threats to freshwater biodiversity in St. Lucia in 2010 (number of respondents out of 505).

Species perceived as indigenous to St. Lucia

Respondent named a large number of terrestrial species as being native, so that these were separated into animals (Figure 8) and plants (Figure 9) for this report. Not surprisingly, the national bird, the endemic St. Lucian parrot (*Amazonas versicolor*), topped the ranking of native animals. This flagship species is prominent on school curricula and not necessarily restricted to the science area. The iguana, presumably referring to the native iguana, was the second most frequently mentioned native animal species. Surprisingly, in third place, the alien iguana [sic] featured. The Scribes would only have noted this down if the respondent explicitly mentioned the word “alien”. This means that the term “alien iguana” is well known, but that people either do not know or not think about the meaning of the word “alien”. It also indicates a rather lax interpretation of the term “native”. The list in Figure 8 is dominated by general terms and introduces species, which range from ecologically relatively harmless (cattle, chicken) to recognized IAS: pigs, goats, dogs, opossum, cats, sheep, rats, and mongooses.

Figure 9 illustrates that St. Lucians are even more familiar with plants than with animals. The most frequently mentioned plant perceived as native was the mango tree (*Mangifera indica*), a crop introduced from the Indian sub-continent several centuries ago. The national tree, calabash (*Crescentia cujete*), reached place two. The third place was taken by another crop introduced from Asia: banana, which is of Malayan origin. The plant list in Figure 9 continues as a mix of local plants and common crops, many of which have been introduced generations ago, e.g. *Citrus* spp.

St Lucian also volunteered the names of a great variety of aquatic organisms (animals and plants) (Figure 10). The crayfish was by far the most frequently mentioned creature. Both native and exotic species exist, but none of the respondents made any reference to this fact. More disturbingly, water hyacinth (*Eichhornia crassipes*), locally better known as water lily, ranked second. This invasive ornamental is of Amazonian origin and is among the “World’s worst 100 IAS”, but has not been flagged as a problem to the St. Lucian public. Crabs came third; again, both native and exotic species exist. It is worth noting that two more “world’s 100 worst IAS” made it onto the list of commonly mentioned organisms perceived as native aquatics: tilapia ranked 20th and the terrestrial mongoose came 39th. The latter had already ranked 20th as a “native” terrestrial (Figure 8). Seagrass enjoyed a surprising 10th place. Both native and alien invasive species exist in St. Lucia.

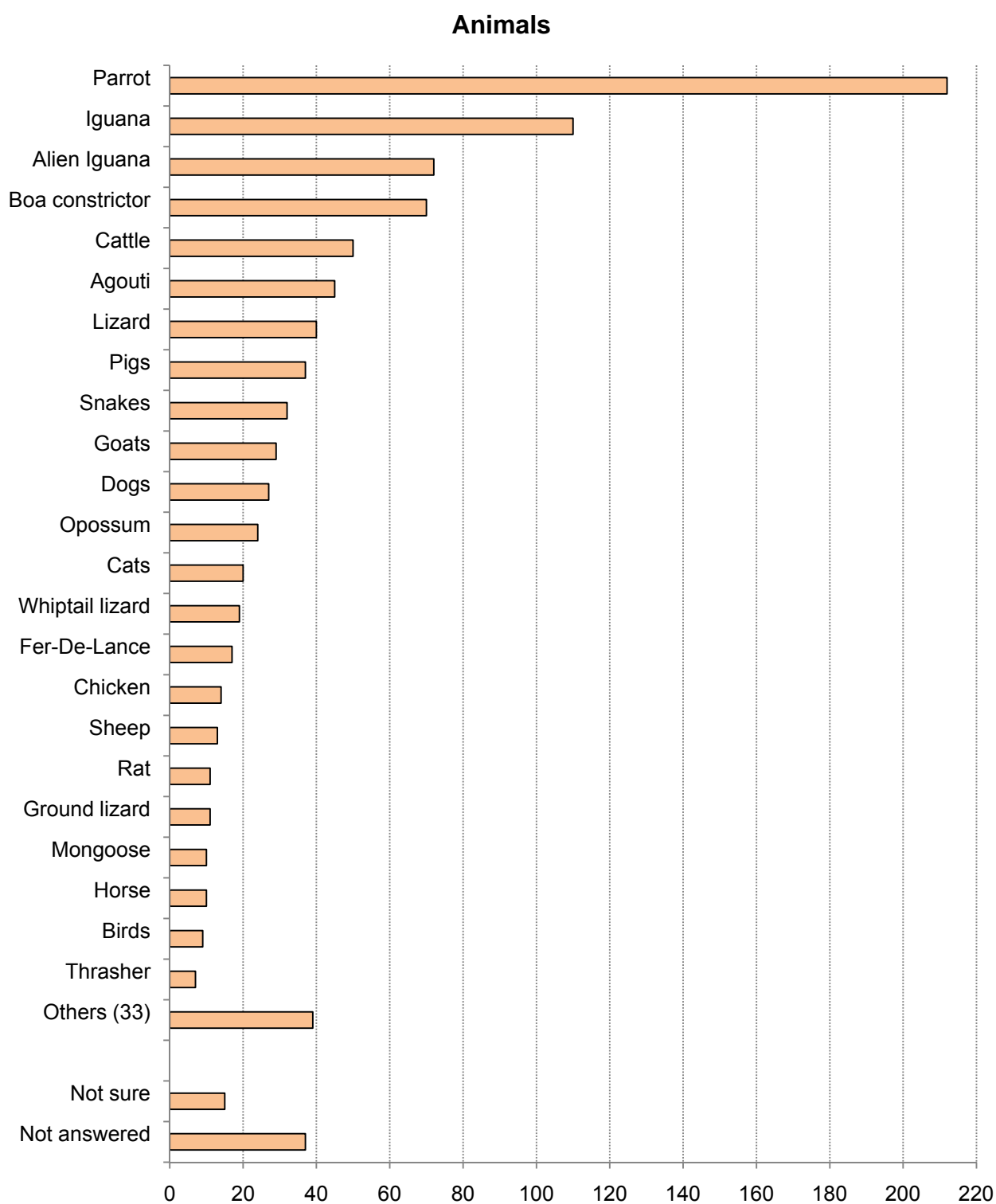


Figure 8: Terrestrial animals perceived as native (number of respondents out of 505).

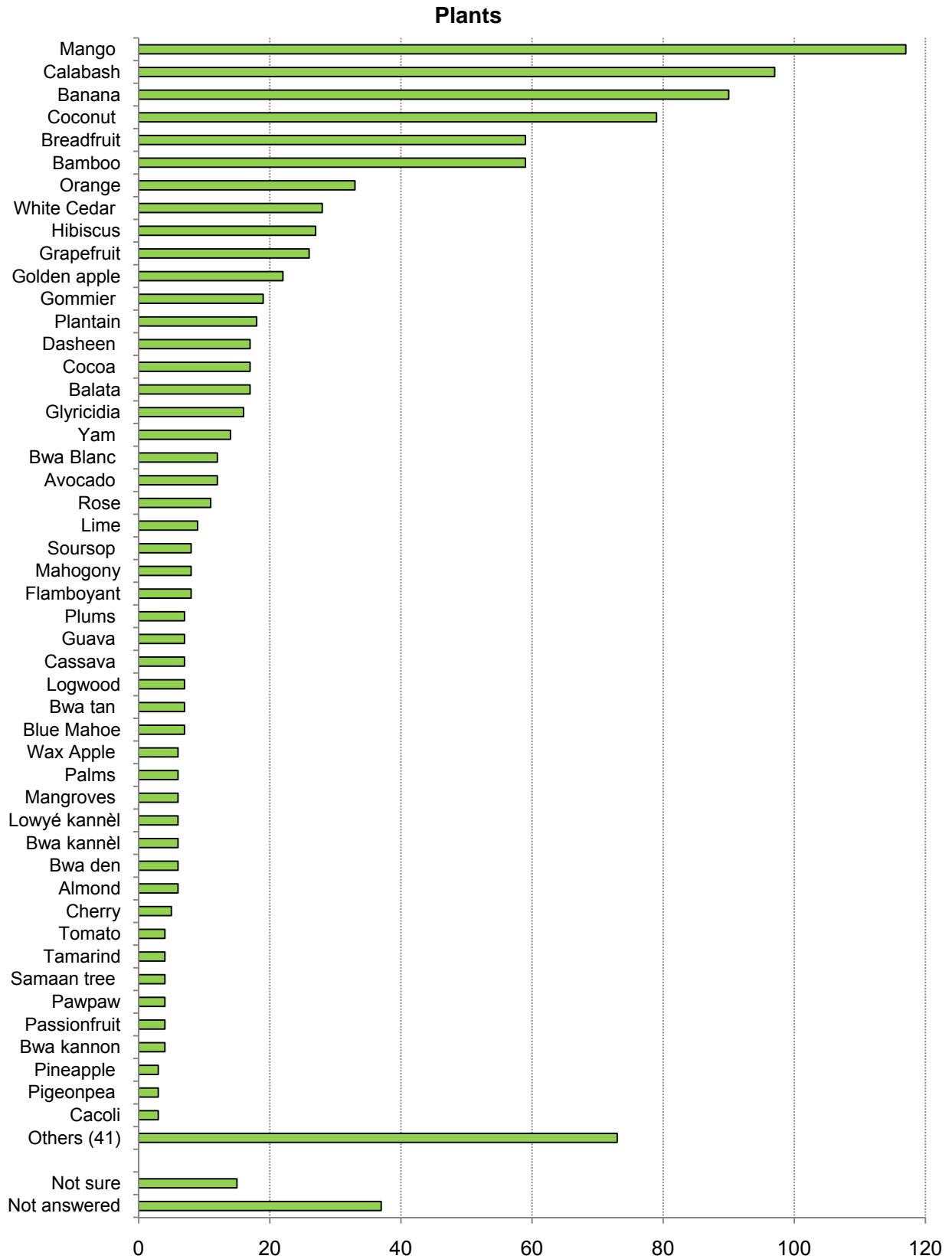


Figure 9: Terrestrial plants perceived as native (number of respondents out of 505).

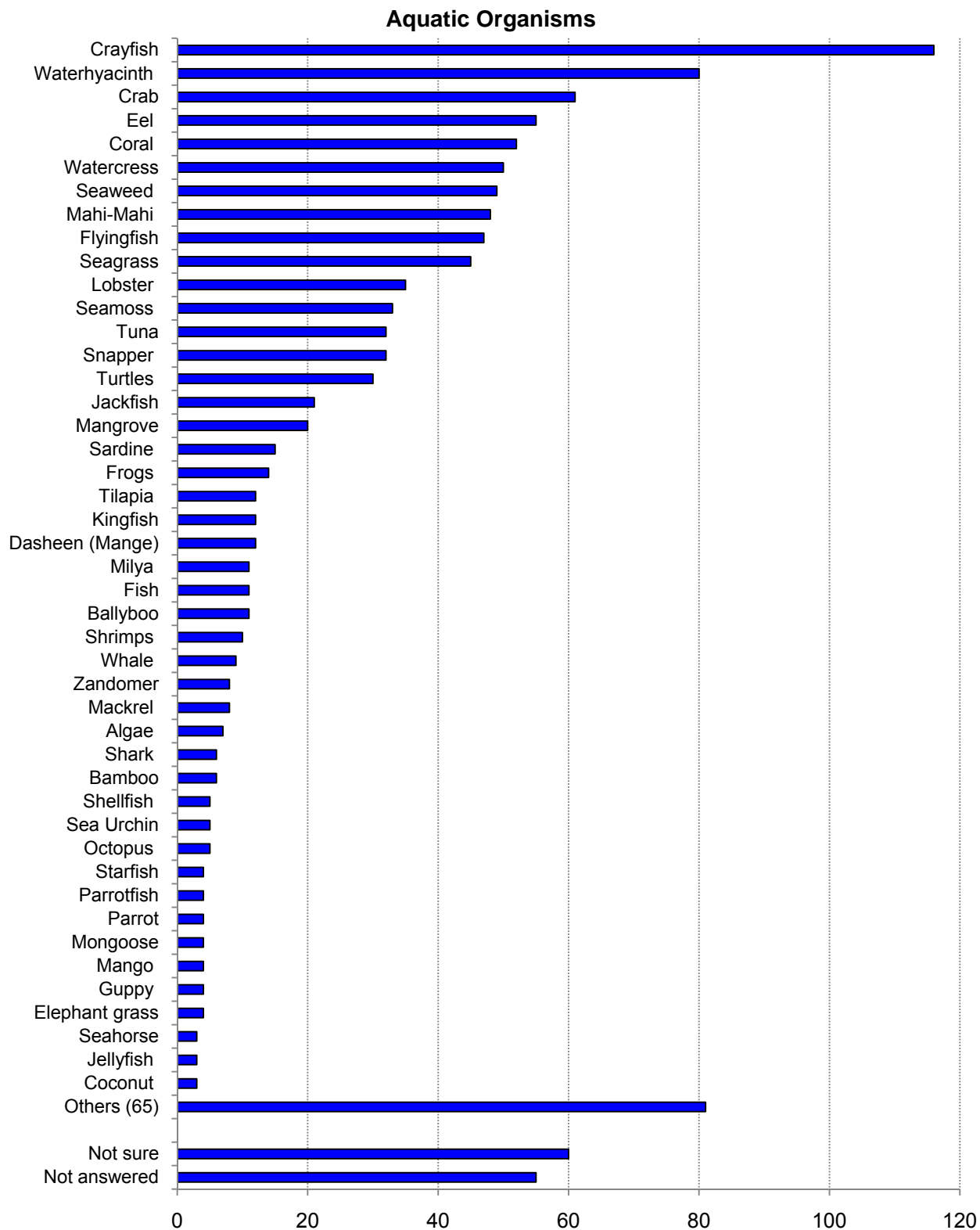


Figure 10: Aquatic organisms perceived as native (number of respondents out of 505).

Baseline awareness of Invasive Alien Species (IAS)

Familiarity with the concept of IAS

Only 34% of respondents had ever heard the term “invasive alien species” (IAS), while 66% had not. There was no difference between general locations ($P = 0.462$). At greater resolution, geographic differences became apparent ($P = 0.002$). In Gros Islet, familiarity with the term IAS was highest at 50%, in Dennery, with 12%, it was lowest (data not illustrated). Gender ($P = 0.714$) and age group ($P = 0.170$) had no significant influence on this parameter, but job level did ($P = 0.002$). As for biodiversity, technical/clerical staff (48%) were most likely to have heard of IAS, followed by academics/management (46%). The self- and unemployed were least likely to have heard of IAS (both 17%), being only marginally surpassed by students (18%) on this occasion, who remained below the retired (20%). Familiarity with the term IAS was unrelated to the first choice of information on environmental issues ($P = 0.242$).

A third of the population (33%) could explain what IAS meant with reasonable accuracy. A similar number (34%) said they could not; 16% did not answer the question and 1% of respondents were not asked this question. Sixteen percent of the population had a partial idea what IAS were. Generally people recognized that IAS were exotic species; their effect, however, was little known. People who had previously heard the term “IAS” (58%) or who had a correct concept of “biodiversity” (59%) were far more likely (both $P < 0.001$) to be able to explain what IAS were in their own words than those who had not (both 23%).

It was essentially a sub-set of an educated population in the Soufriere area that was best able to explain what IAS were, as in contrast to familiarity with the term IAS, highly significant ($P < 0.001$) differences were found between general locations. With 71% of correct explanations, knowledge was highest in the Soufriere area, but low in both Vieux Fort (20%) and the rest of the country (31%). Soufriere inhabitants were also most likely to articulate a clear response (Figure 11).

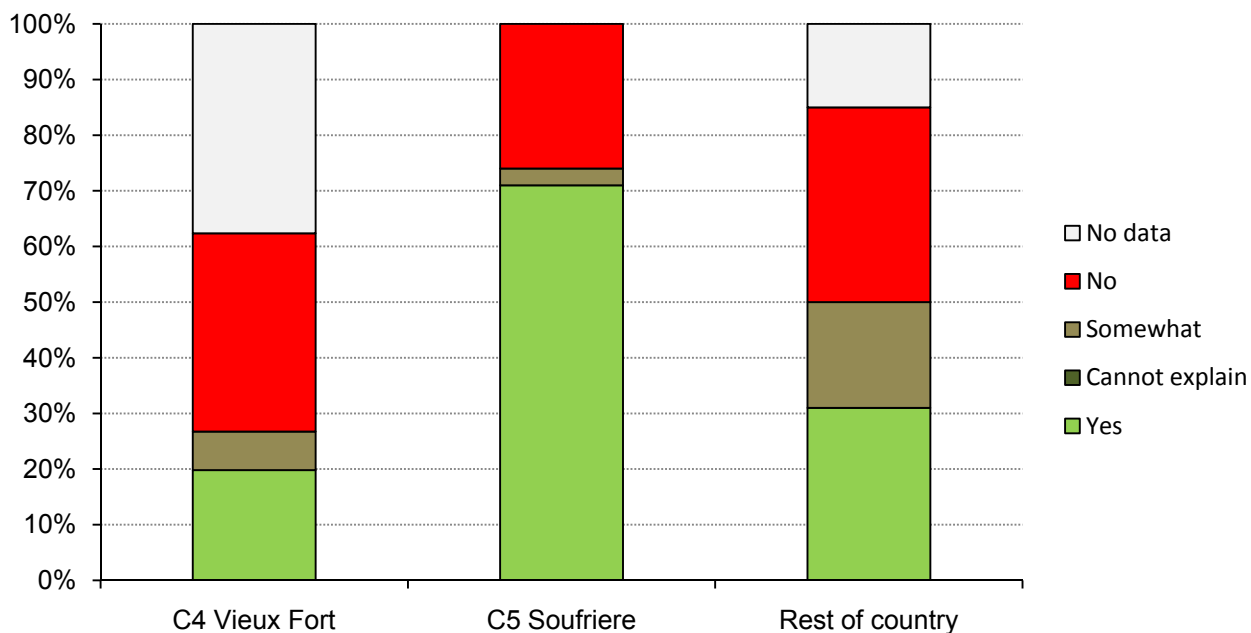


Figure 11: Percentage of population who could explain what Invasive Alien Species (IAS)

Knowledge on IAS was not significantly related to age group ($P = 0.098$), whereas the job level was important ($P < 0.001$). Academic/management and technical clerical personnel were most likely to volunteer a correct explanation (51%). The retired were least likely to provide a correct answer (10%), followed by the self-employed (15%). Students (23%) fared only marginally better than the unemployed (21%), but worse than manual labourers (24%). Across the OECS, Chamber & Smith (2007) found the level of education and general familiarity with environmental issues to be an important factor in recognizing the importance of IAS to the environment.

Across the country, 62% of respondents believe IAS impact biodiversity in St. Lucia, while 35% believe they do not. People had clear opinions on this issue and only 3% chose not to answer the question. It is noteworthy that a significantly ($P < 0.001$) higher proportion of Soufriere inhabitants (62%) was of the opinion that IAS do not influence St. Lucian biodiversity (Figure 12), although in this area, the understanding what IAS are was highest (Figure 11). In fact, having an understanding of what biodiversity is and what IAS are, which required the respondent to recognize a negative effect of IAS, and believing they impact St. Lucian biodiversity were unrelated phenomena ($P = 0.516$ and $P = 0.611$, respectively). Could this be another expression of a common smokers' attitude: "Yes, smoking damages health, but nothing will happen to me."?

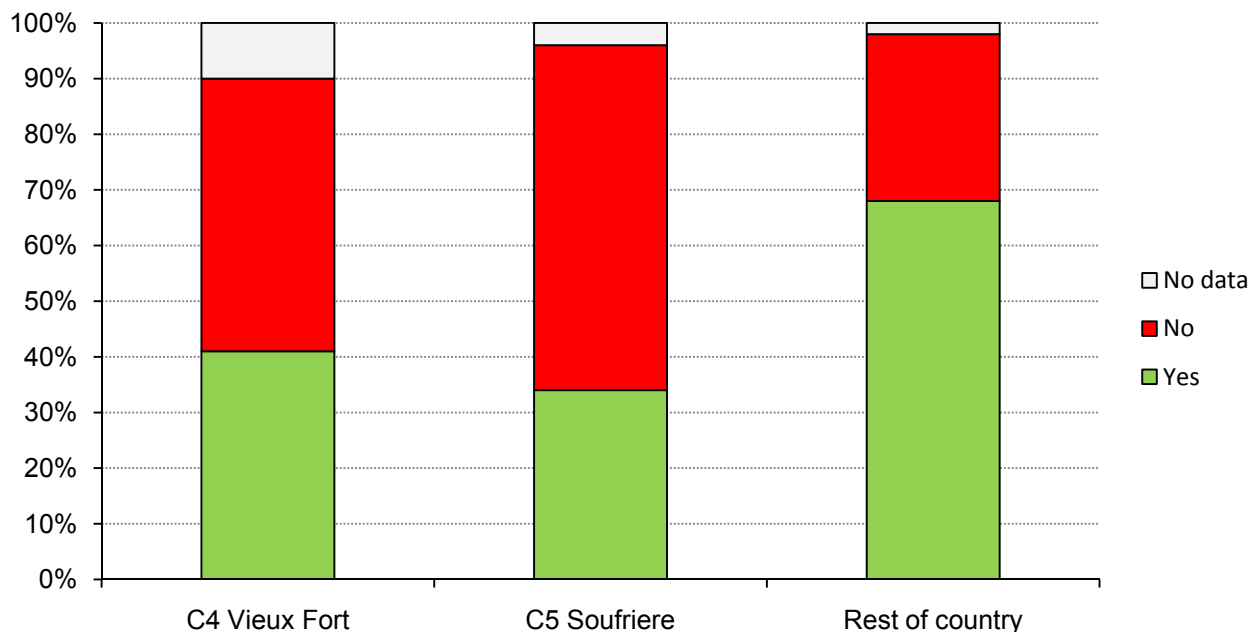


Figure 12: Percentage of population who believe IAS impact St. Lucian biodiversity.

At a higher geographic resolution, this trend was continued: the belief that IAS affects biodiversity was lowest in Soufriere (34%) and second lowest in Vieux Fort (41%); it was highest in Dennery (78%), followed by Castries (69%). Age group ($P = 0.190$) and job level ($P = 0.607$) had no effect on this opinion.

Familiarity with specific IAS

When those respondents who did believe in the negative impact of IAS on St. Lucian biodiversity were asked to name examples of IAS that affect or threaten St. Lucian biodiversity, a total of 62

taxa were named. The most recognized were the giant African snail (GAS), the pink Hibiscus mealybug (PHMB), diseases, alien iguanas, termites, feral pigs, Black Sigatoka, crayfish, wax apple, and German cockroaches (Figure 13). The lionfish, which is not yet present, ranked 18th and was one of only two named IAS that are still absent from St. Lucia. The other one was Moko disease of banana, ranked 30th. It is not surprising that mentioned IAS tended to be those that (also) impact agriculture.

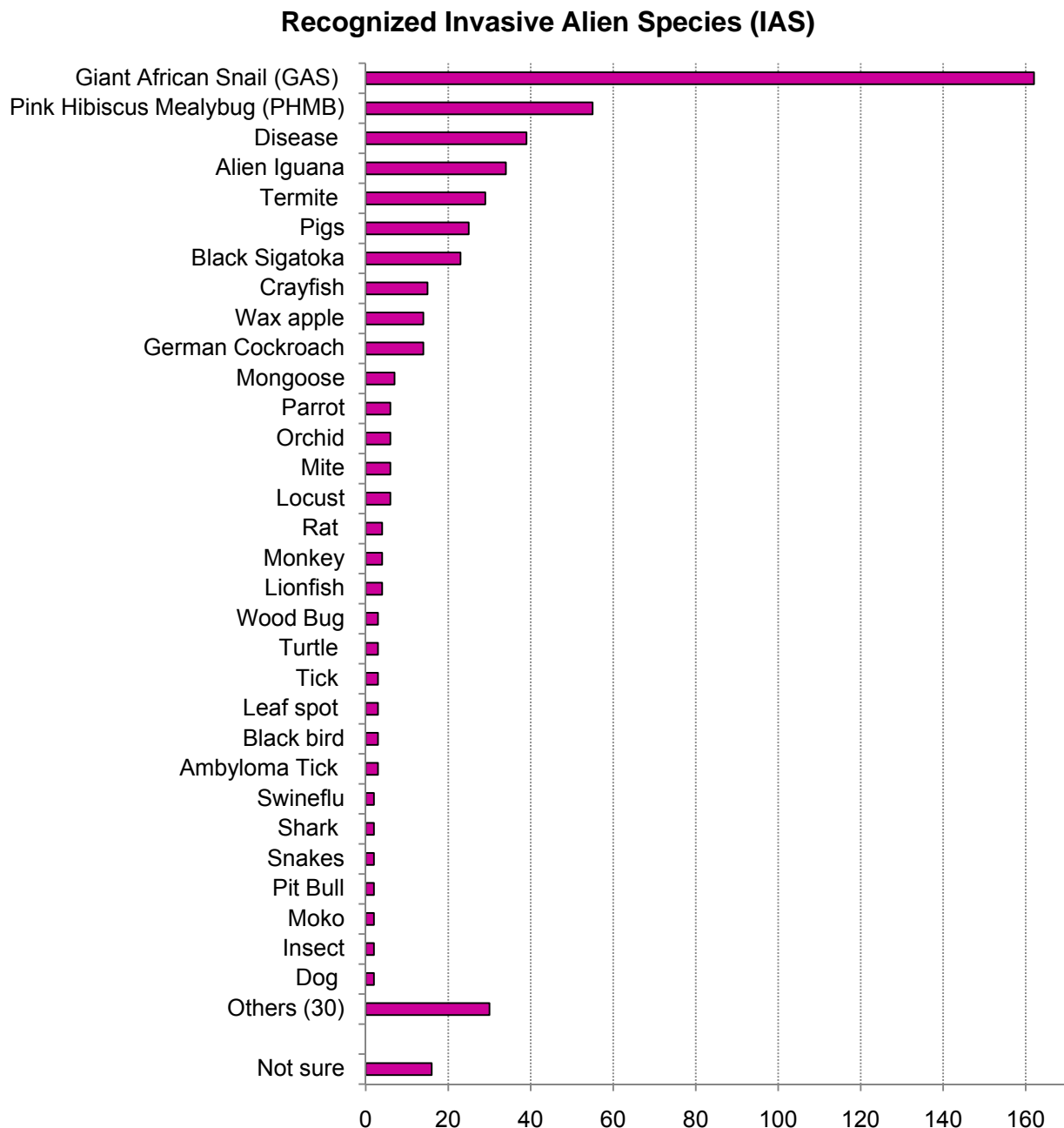


Figure 13: Invasive alien species (IAS) viewed as damaging or threatening in St. Lucia (number of respondents out of 505).

Additional analyses were carried out on the 10 most frequently mentioned IAS, plus the lionfish as the highest ranking absent threat and a C4 pilot species. For most of these species, awareness was independent of the first choice of information source ($0.208 \leq P \leq 0.995$). The exceptions were the PHMB ($P = 0.042$) and feral pigs ($P = 0.001$). These were most frequently mentioned by people who obtained their environmental information from workshops and from personal contacts (friends, family, neighbours and colleagues), respectively. With very low numbers, the lionfish narrowly failed to reach significance ($P = 0.056$), with all four respondents who volunteered it in this section of the questionnaire favouring the internet as information source for environmental issues.

Significant geographic variations in awareness were found with respect to GAS, PHMB and the alien iguana. With 62% the Northern Range was clearly ($P < 0.001$) above the national average of 42% for GAS. GAS was least mentioned in Soufriere (14%) and Vieux Fort (25%). PHMB was mentioned most frequently in Millet (22%), followed by Gros Islet (17%), which were above the national average of 15% ($P = 0.029$). Again Vieux Fort (8%) and Soufriere (6%) had the lowest awareness of the PHMB.

Awareness of the alien iguana was clearly highest in the Soufriere area, to which this IAS is restricted ($P < 0.001$; Figure 14), indicating an educational impact of the eradication programme started by the Forestry Department in collaboration with the Durrell Wildlife Conservation Trust there. At higher resolution, the difference remained significant ($P = 0.009$), but did not single out any additional location; i.e. people in the Dennery area (3%), where the native iguana is found, were no more concerned about the threat posed by the alien iguana than the country excluding Soufriere (5%).

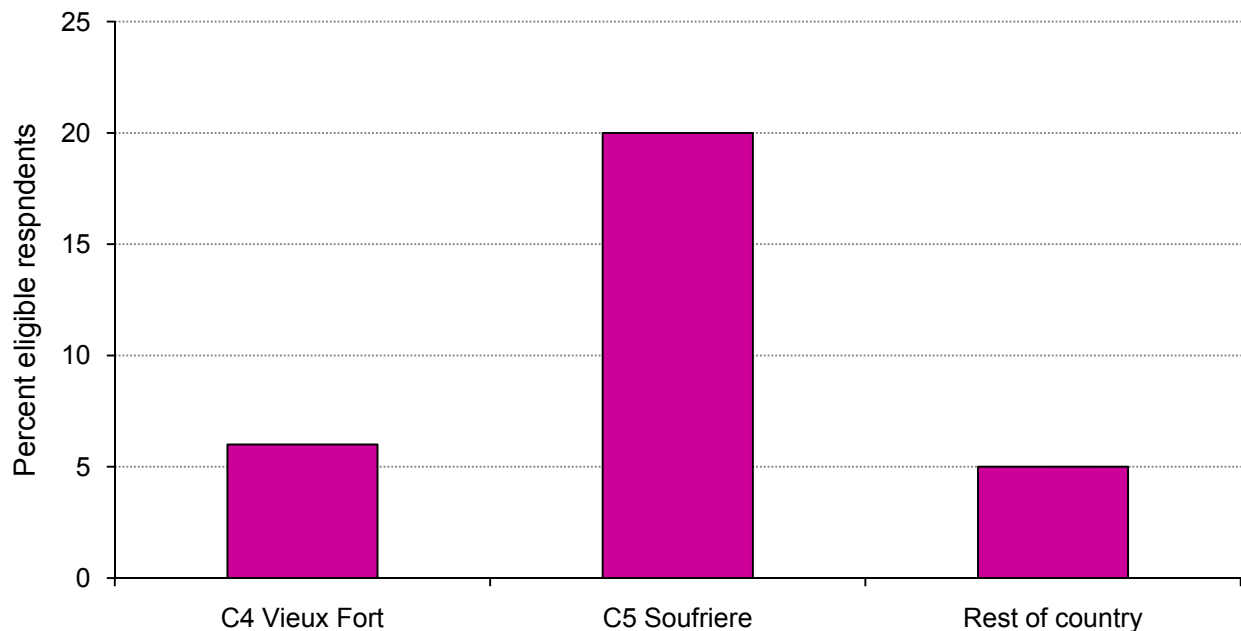


Figure 14: Percentage of eligible respondents mentioning the alien iguana as IAS threat in St. Lucia by general location.

Attitudes towards the introduction and spread of IAS

Deliberate introduction of IAS by people into St. Lucia was viewed as by far the most important mechanism of introduction. The count shown in Figure 15 is still an underestimate, because there were also the categories “people” without specifying if the introduction was accidental or deliberate, “smuggling” and “entry ports”. Trade (importation) ranked second. Some answers were somewhat ambiguous: it was not always clear whether a mechanism was active or passive movement, e.g. travelling or by sea. For follow-up surveys, Interfacers should be instructed to seek clarification in such cases.

People also ranked high (on second place) on respondents’ mind for mediating the spread of IAS within St. Lucian territory, only surpassed by reproduction (Figure 16). But fewer respondents stressed any intent.

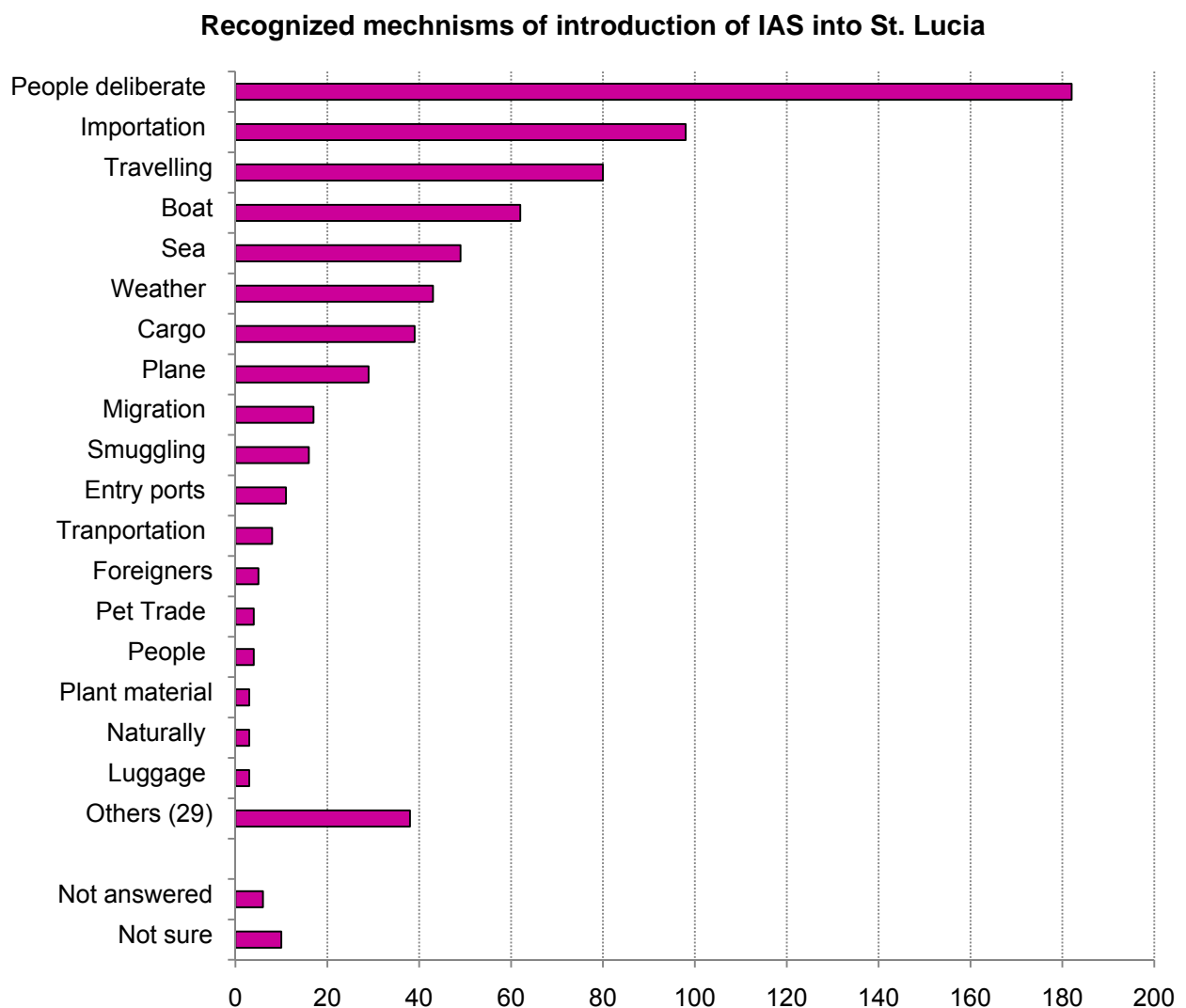


Figure 15: Mechanisms deemed important for the introduction of Invasive alien species (IAS) into St. Lucia (number of respondents out of 505).

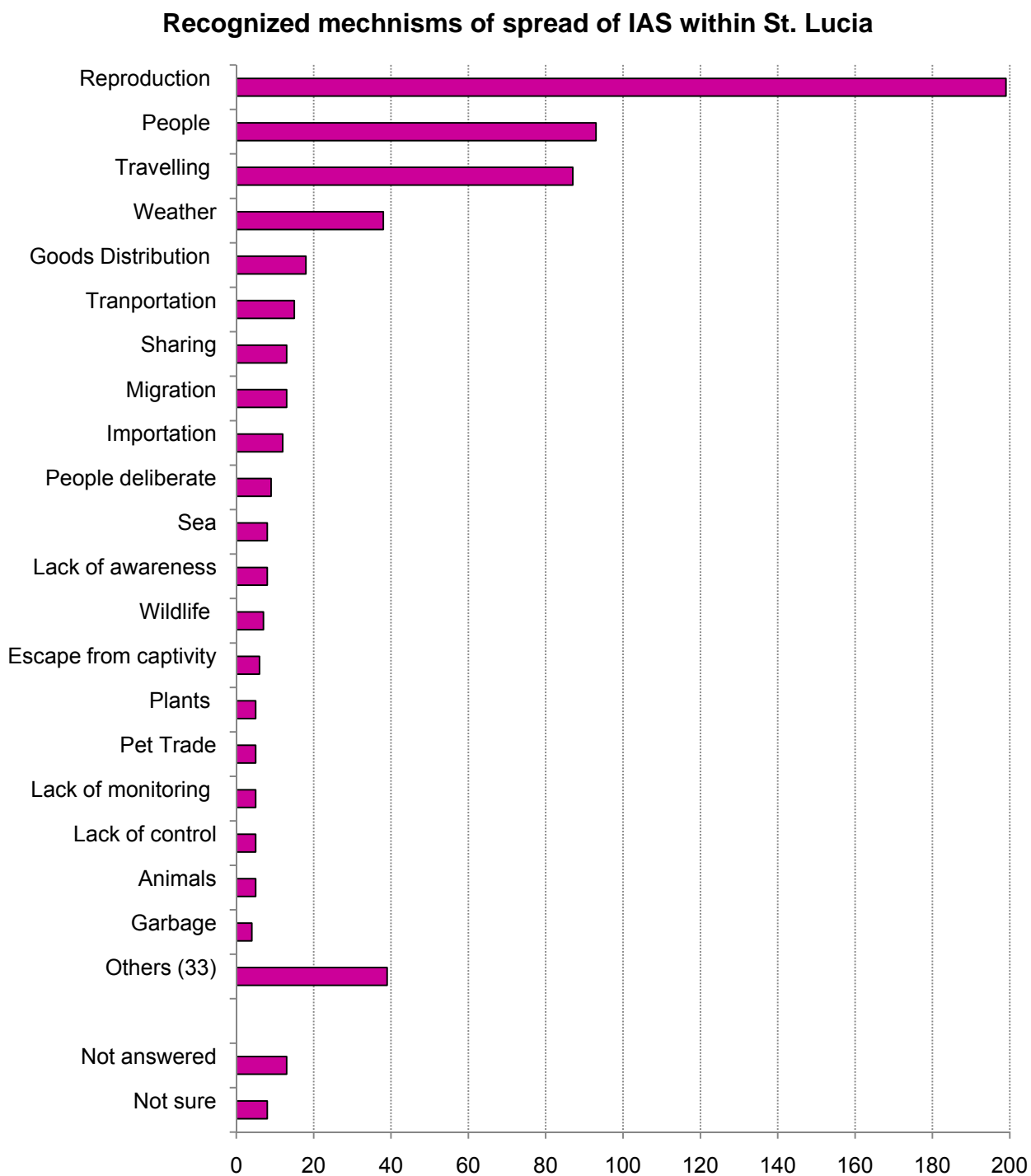


Figure 16: Mechanisms deemed important for the spread of invasive alien species (IAS) within St. Lucia (number of respondents out of 505).

“Escape from captivity” rated 14th. John (2001) identified considerable interest in capture of local and the importation of exotic wildlife pets, especially among the younger generation in the north of the island. He identified risks that the capture of rare wildlife for trade or the escape of exotic wildlife kept as pets could have to human and animal health as well as ecosystems. He recommended awareness-raising, as the implications of exotic wildlife pets are poorly understood by the public.

Attitudes towards IAS management

St. Lucians were very open to the option of destroying (killing) IAS that had entered the national territory (Figure 17). Interestingly, prevention in form of entry quarantine was also very desirable. Furthermore, respondents desire awareness-raising activities and relevant legislation to be enacted and implemented by authorities, including the introduction of penalties.

A marked number of respondents suggested to put IAS into captivity. Thus, any awareness-raising campaign should flag the risks associated with such a move.

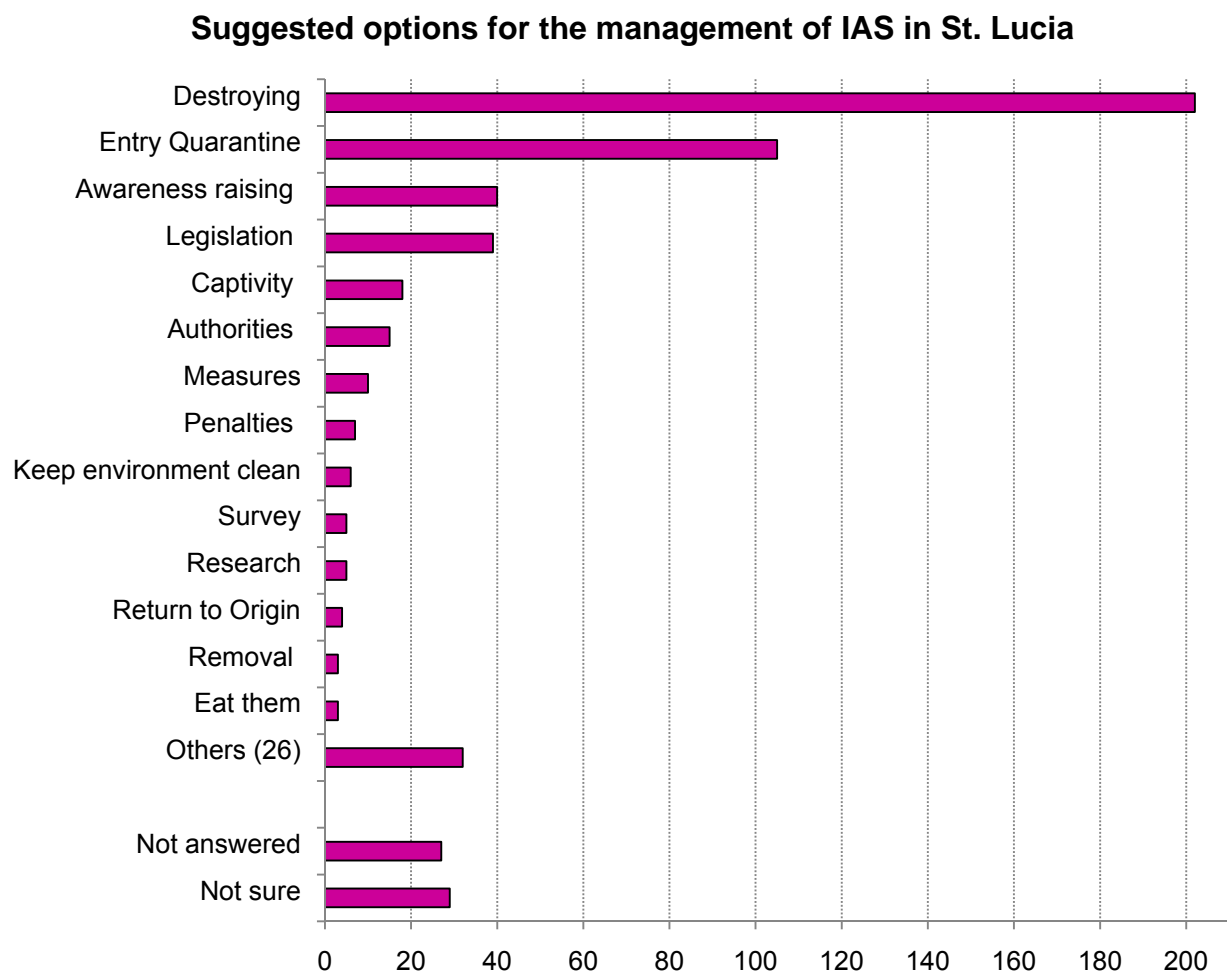


Figure 17: Management options for IAS suggested by respondents in St. Lucia (number of respondents out of 505).

Question 13 of the general questionnaire (Appendix 1), which was attempting to scout what activities the St. Lucian public would be willing to support actively, did not yield the desired result, as too many respondents repeated what should be done by authorities rather than what was within their own zone of influence. Thus, no analysis is presented. Nevertheless, responses underline that St. Lucians are not only accepting, but willing to collaborate with authorities regarding the destruction of IAS, awareness-raising and efforts of the authorities charged with managing IAS. In future surveys, the Interfacers should ensure that the answers to this question are focusing on the relevant point. Public education may also wish to flag constructive ways citizens can assist in IAS management.

Vieux Fort Area: Component 4 Pilot Questionnaire Results

Baseline awareness of Vieux Fort respondents on off-shore islands

Most respondents in the Vieux Fort area were familiar with one or more off-shore islands (Figure 18). Over 90% of the population named the Maria Islands, located within the Vieux Fort area, followed with great distance by Rat Island, in the north of the country, at 41%, and then several east-coast islands.

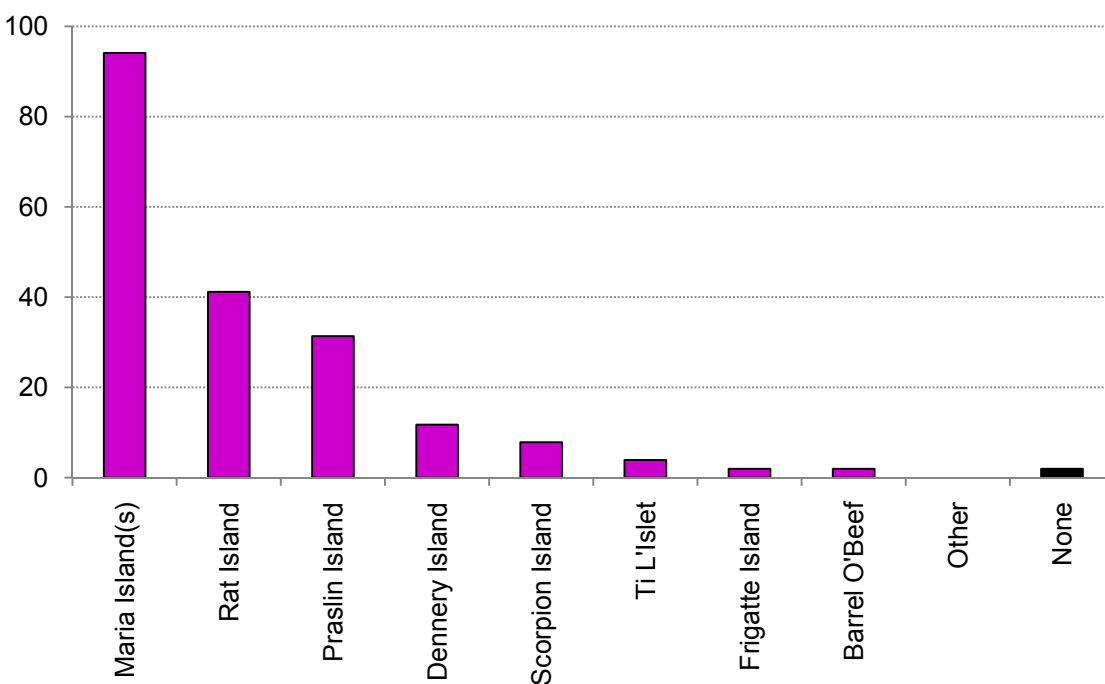


Figure 18: Percentage of respondents familiar with one or more of St. Lucia's off-shore islands.

Eighty-eight percent of respondents said off-shore islands are important; 10% were not sure and only 2% saw no importance of off-shore islands (Figure 19). "Opportunity for tourism" was stated

most frequently (69%), followed by “habitat for animals” (57%) and recreation (25%). Only 6% of respondents saw them as useful for livestock grazing.

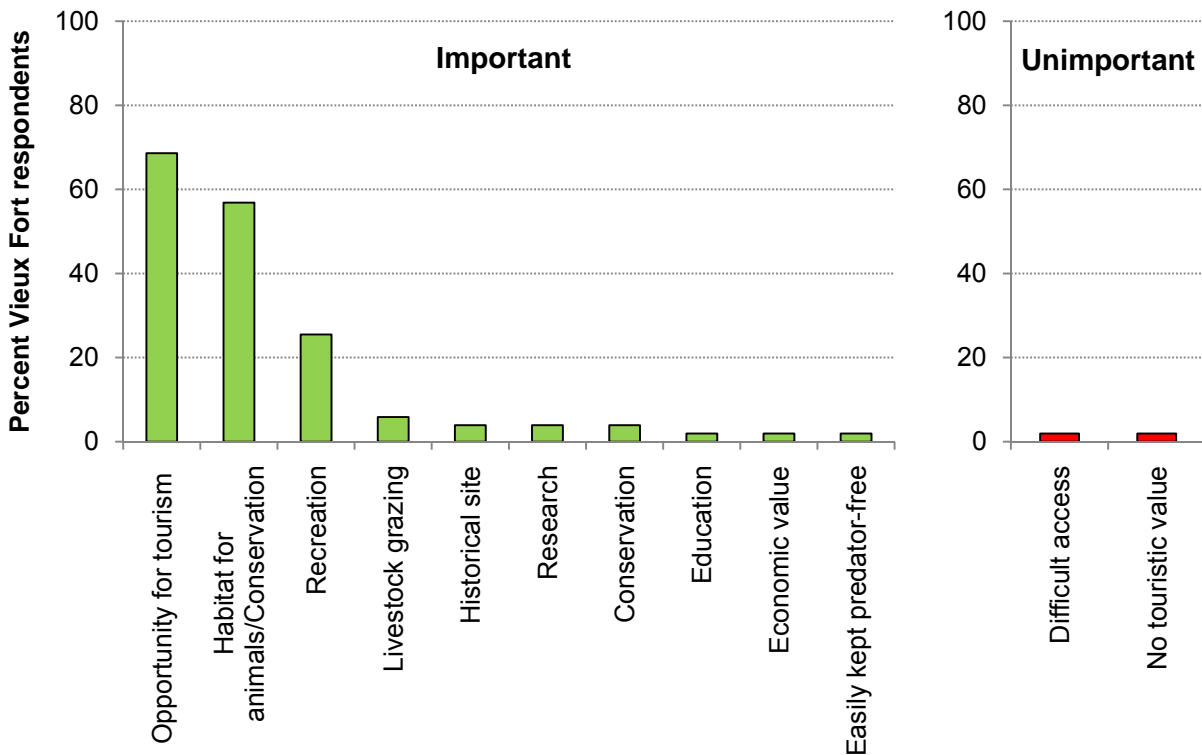


Figure 19: Importance of off-shore islands as perceived by respondents in the Vieux Fort area (in %).

The negative phrasing of question C4-4 (Appendix 1) on the effect of ridding off-shore islands of rats and mongooses caused considerable confusion among respondents, many of whom clearly interpreted the question as enquiring about the effect the presence of rats and mongooses would have on the islands. Thus, answers were separated into four categories in an attempt to extract what the respondents wanted to express (Figures 20-21). For follow-up surveys, this question should be rephrased positively to read: “What effect do rats or mongooses have on off-shore islands ?” with the associated answer categories adjusted accordingly.

Nearly 12% of respondents were aware of plant and animal species surviving on off-shore islands in the absence of rats and mongooses, and this was the most frequent answer to question C4-4. Nearly 10% explicitly stated that unique St. Lucian species could survive in the absence of such predators (Figure 20a) and the same number of respondents mentioned that rats and mongooses carried pest and disease where they were present (Figure 21a). Three answers tied in third place at 7.8%. These respondents felt the absence of rats and mongooses made the off-shore islands a nice place to visit (Figure 20a) or that these animals destroyed the islands natural resources, bird and other animal species (Figure 21a).

Of those who preferred rats and mongooses to be left alone on the off-shore islands, most were not sure why (9.8%) (Figure 20b). Nearly 6% believed there must be something wrong with an off-

shore island, if there are no rats or mongooses. Two percent remarked that these species control snakes (Figure 20b) and other IAS in general (Figure 21b).

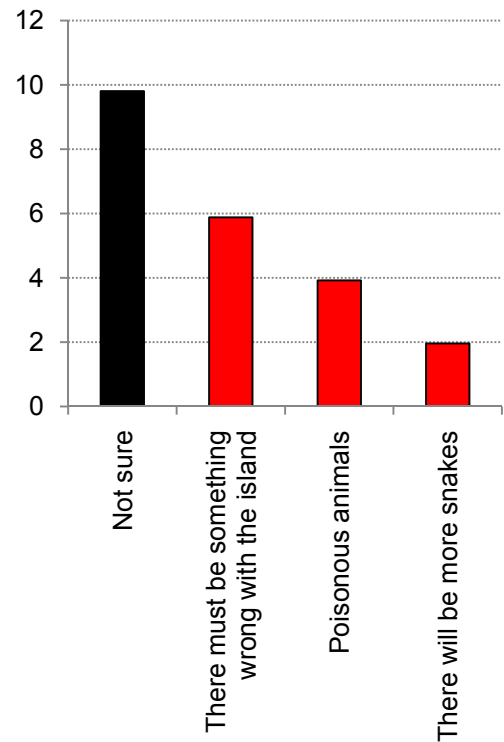
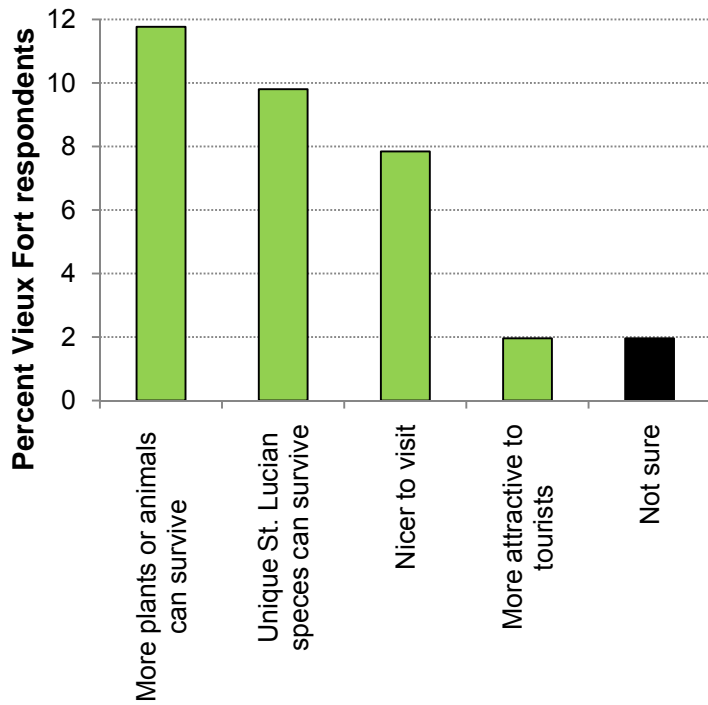


Figure 20 (a): Positive effects if there are no rats or mongooses on off-shore islands

(b) Negative effects if there are no rats or mongooses on off-shore islands

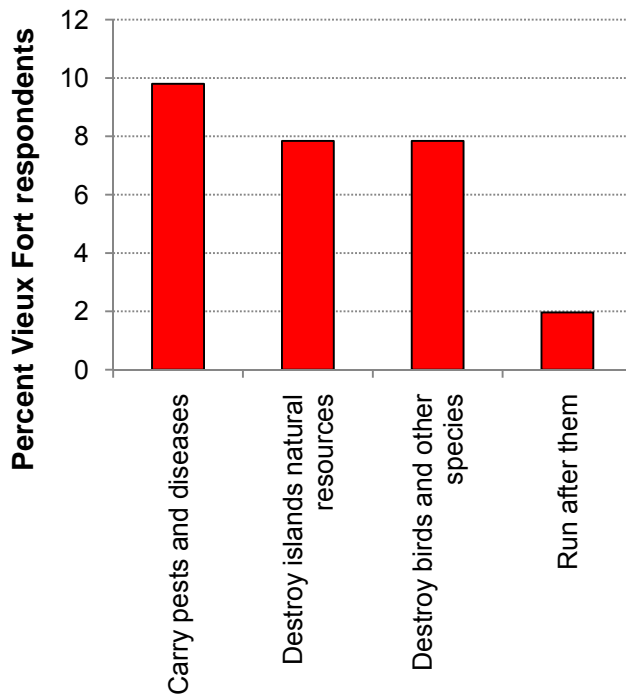


Figure 21 (a) Negative effects if there are rats or mongooses on off-shore islands

(b): Positive effects if there are rats or mongooses on off-shore islands

Seventy-three percent of Vieux Fort respondents believed rats and mongooses could return to off-shore islands currently free from these IAS; 22% believe they could not and 6% were unsure. The most common suspected mode of return is via accidental transport by people (37%) and another 16% stated a related mode: stowaway on boats (Figure 21). Twenty-five percent of respondents believe these mammals would swim there, while 16% believe people might take them there deliberately. Garbage left on the islands was viewed as attractive to rats by 14%. Garbage left on the islands was viewed as attractive to rats by 14%.

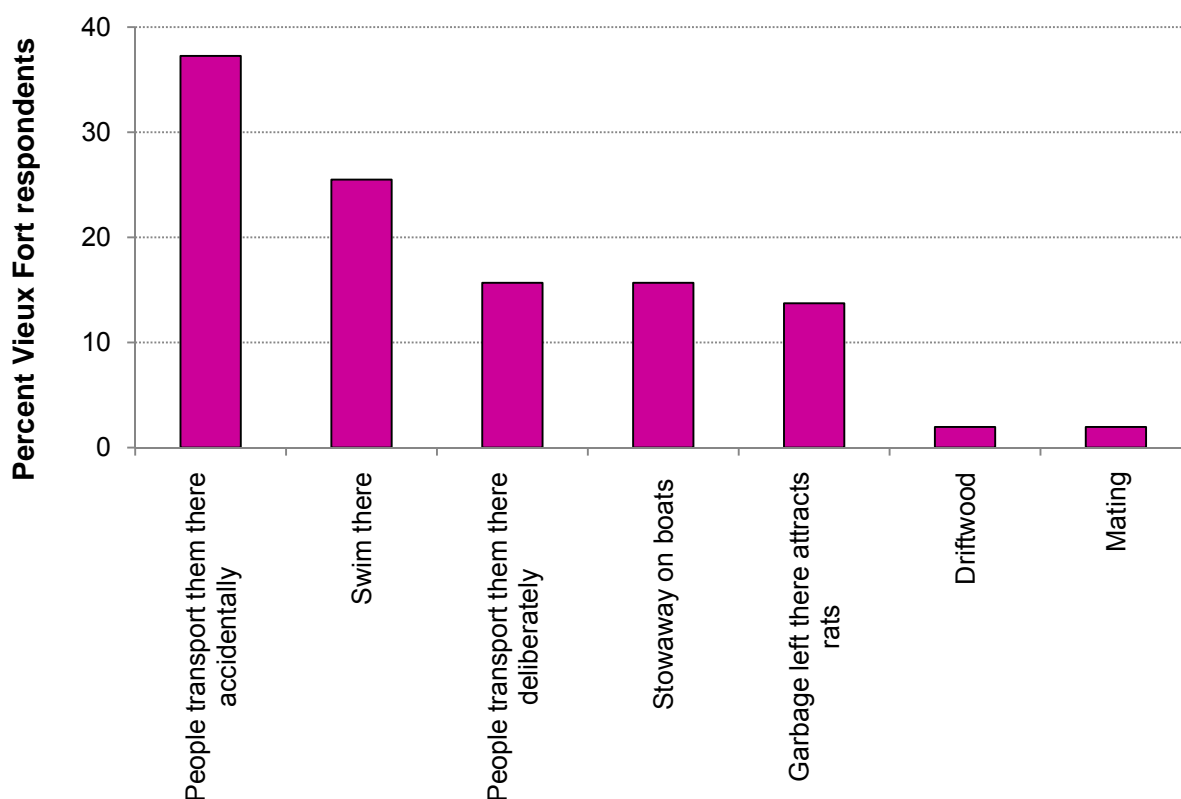


Figure 21: Perceived ways of how rats and mongooses could get back onto off-shore islands

Baseline awareness of Vieux Fort respondents on lionfish

Only 29% of respondents had ever heard of the lionfish; 4% were uncertain and 67% admitted they had not. This was independent of age group ($P = 0.875$), job level ($P = 0.112$), preferred source of information ($P = 0.639$) or whether the respondent had a fair idea what IAS were ($P = 0.337$).

Respondents were shown a picture of a lionfish and all interviewees were asked where they believed lionfish occurred. The vast majority (75%) did not feel confident to offer a guess (Figure 22).

Respondents were more forthcoming with ideas on what effect lionfish could have should it enter into St. Lucian waters, with fewer than 20% of people preferring not to speculate (Figure 23). There was pronounced fear that lionfish will eat local fishes (53%) and decrease local biodiversity (39%). Injury or poisoning was a concern for 16%. Very few respondents saw the lionfish as a possible enrichment of St. Lucian waters (Figure 23), in term of biodiversity, tourism (both 3.9%) or diet (2%). Interestingly, nobody felt the introduction of lionfish would have no effect.

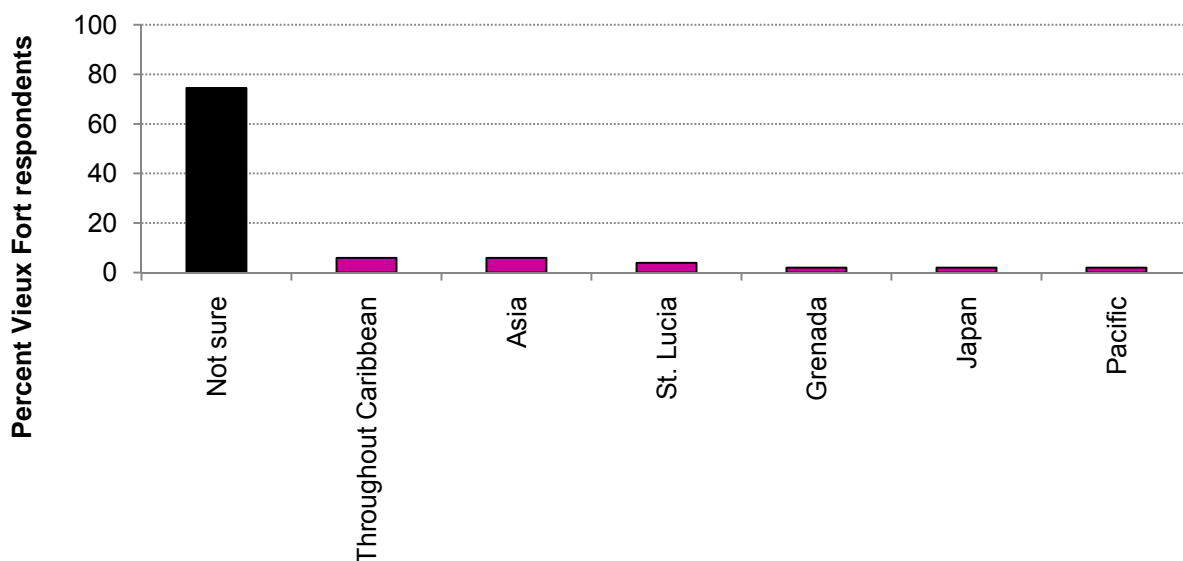


Figure 22: Perceptions of Vieux Fort respondents on locations where the lionfish presently occurs.

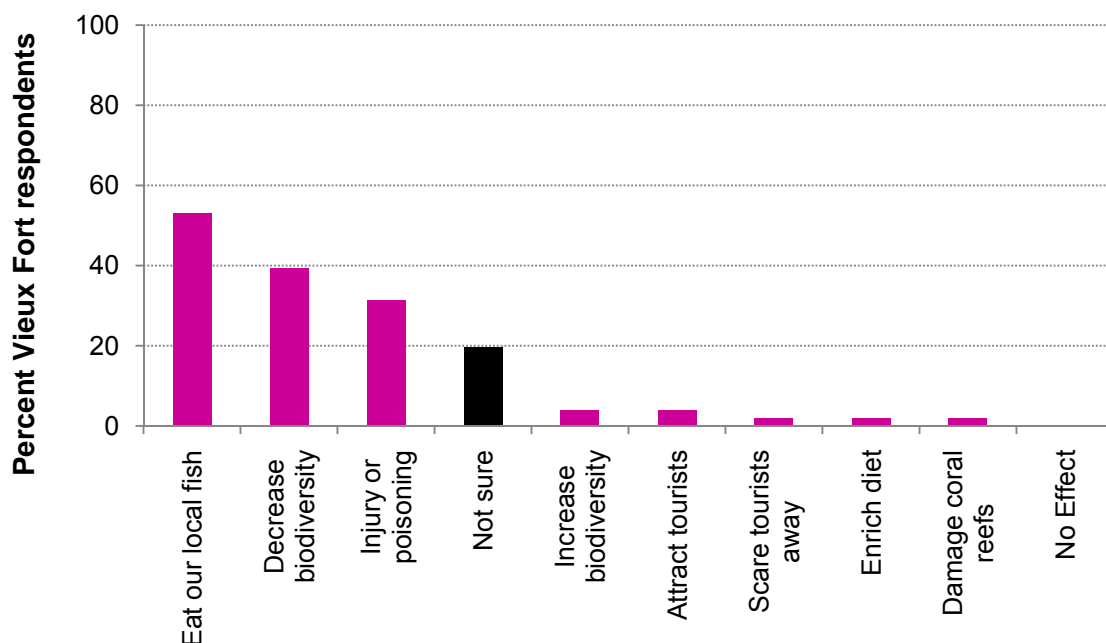


Figure 23: Perceptions of Vieux Fort respondent on possible effects of the lionfish should it enter St. Lucian waters

Baseline awareness of Vieux Fort respondents on IAS pathways

The majority of Vieux Fort respondents believe the main pathway for terrestrial IAS to be via people who bring IAS deliberately (57%) or illegally (2%). Accidental transport by people accounted for 35% of answers. Twenty-seven percent believe IAS arrive a stowaways on boats or aircrafts, while 20% hold sea and air currents responsible. Few people (6%) had no opinion (Figure 24).

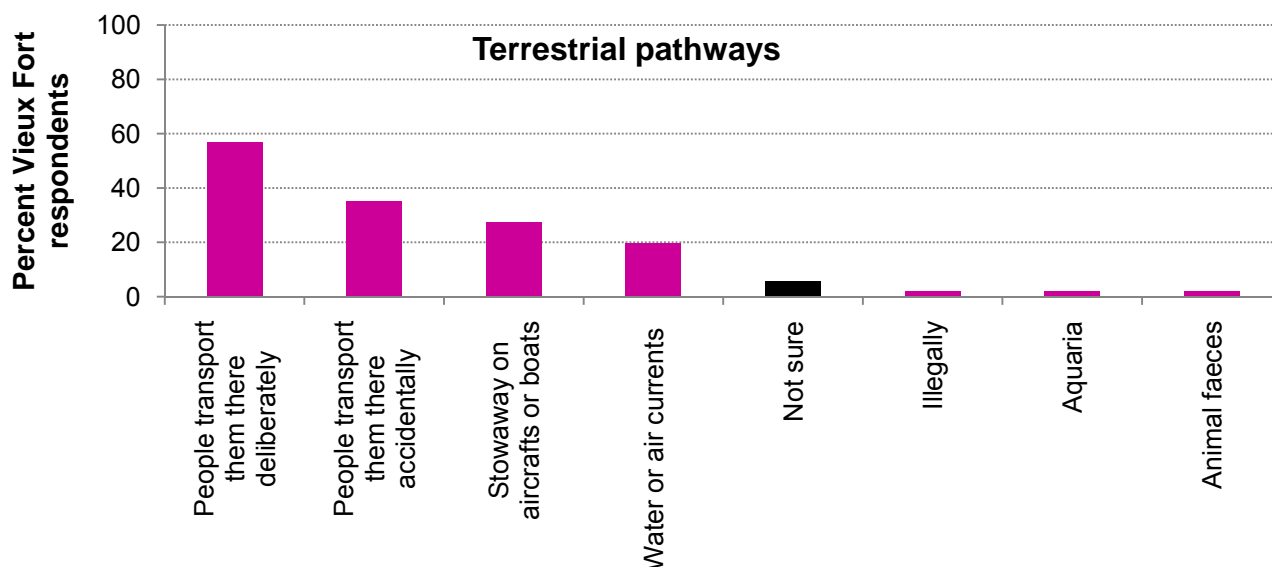
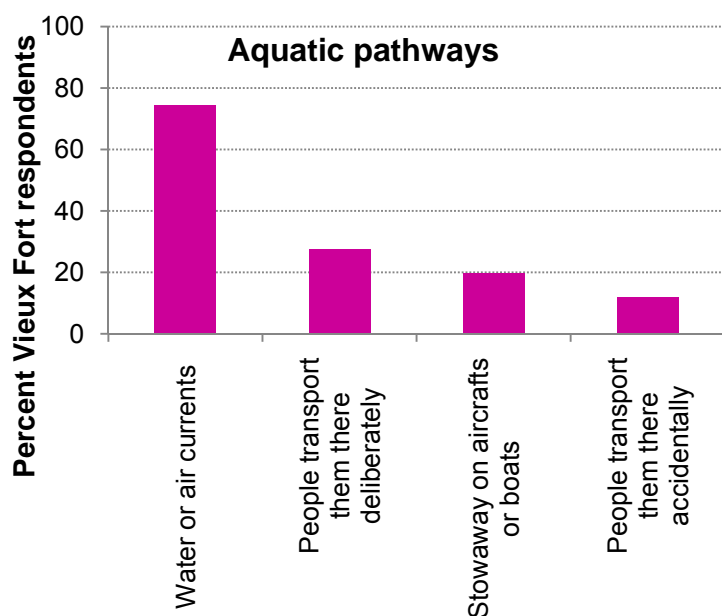


Figure 24: Perceptions of Vieux Fort respondents on likely pathways of introduction for terrestrial IAS into St. Lucia.



Fewer opinions were volunteered for the arrival of aquatic IAS, but with a clearly predominant view that these arrived on air and sea currents (Figure 25). Deliberate transport by people still accounted for 27%, followed by stowaways on boats and aircrafts (20%) and accidentally co-transport with people (12%).

Figure 25: Perceptions of Vieux Fort respondents on likely pathways of introduction for aquatic IAS into St. Lucia.

Soufriere Area: Component 5 Pilot Questionnaire Results

Baseline awareness of Soufriere area respondents on the native and alien iguana

The majority of respondents in the wider Soufriere area (76%) knew what an iguana (léza) was; 10% did not and 14% were not sure. This distribution was independent of age group ($P = 0.081$), job level ($P = 0.418$) and whether the respondents had a fair idea what IAS were ($P = 0.987$).

When shown a picture and asked where iguanas occurred in St. Lucia, a great variety of answers was offered, some of which were not mutually exclusive, e.g. habitats like “forest” combined with locations like “Zenon” (Figure 26). Not surprisingly, most answers referred to the alien iguana that occurs in the Soufriere area. However, a cumulative 8% was aware of the populations of (the native) iguana in the North-East, including Dennery and Grand Anse, and another 4% of the individuals kept in Union Zoo. None of the respondents distinguished populations of alien from native iguanas and no such prompt was provided. A cumulative 12% of respondents offered incorrect answers, i.e. sites where neither iguana occurs, such as Maria Island, Vieux Fort or Castries.

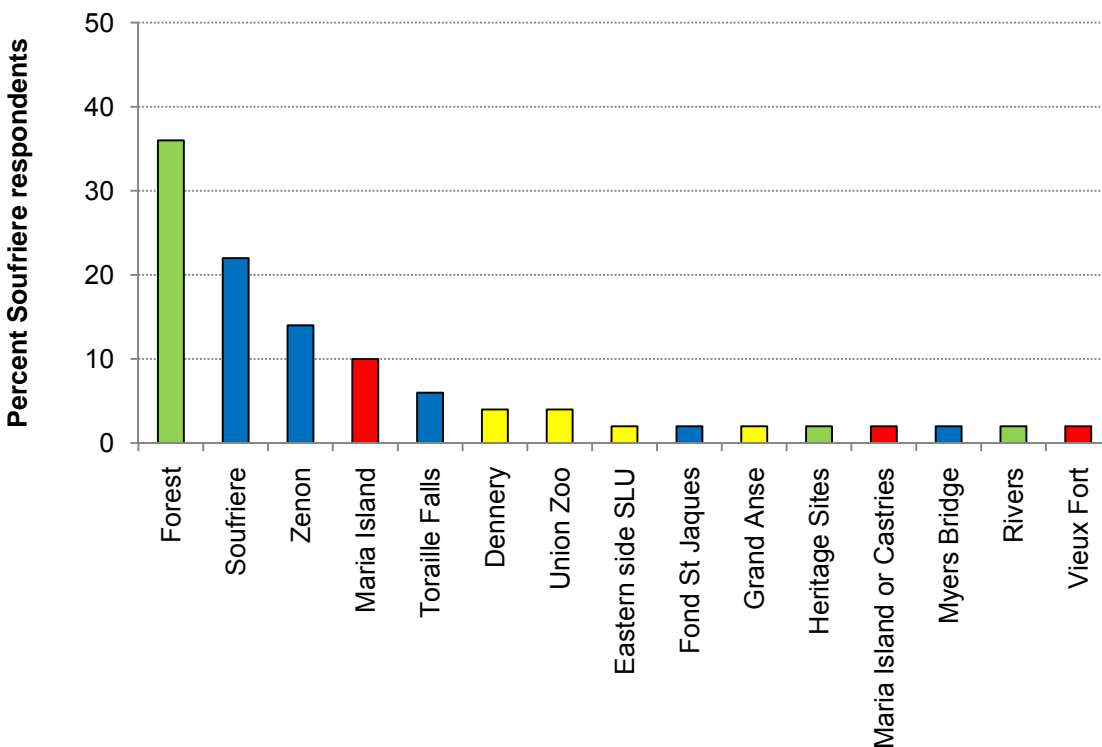


Figure 26: Perception of the distribution of iguanas in St. Lucia (%) of respondents). In reality, the native iguana is found in sites coloured yellow (■), the alien ones in sites coloured blue (■), both in green habitat (■); red bars (■) denote incorrect answers.

The majority (58%) of respondents were aware that iguanas live in the wild around Soufriere; 28% were unsure and 14% were unaware of this fact (Figure 27a). Only those who knew iguanas occurred in the wild around Soufriere were asked how long the iguanas had been there. Again a clear majority (59%) stated that they had been living in the wild for over 10 years, while 21% had known about them for the past few years only. Hardly anybody (3%) believed they had always been there, while 17% were uncertain (Figure 27b).

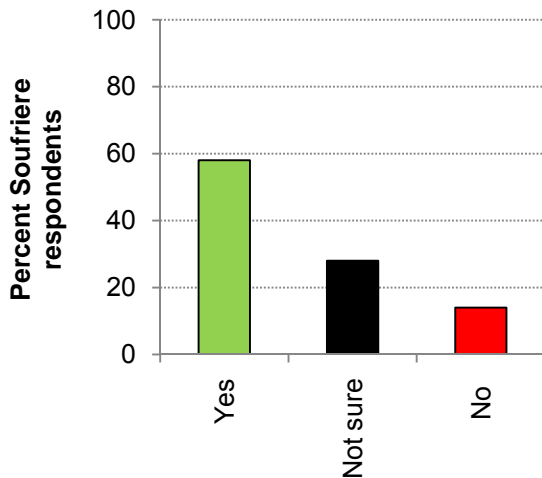


Figure 27a: Opinion as to whether iguanas exist in the Soufriere area in the wild (outside cages)

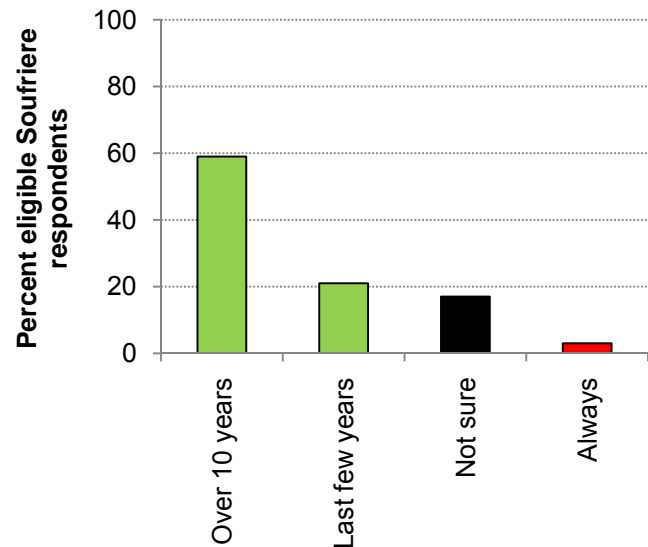


Figure 27b: Views as to how long iguanas have been living in the Soufriere area in the wild.

An overwhelming majority (87%) of those aware of iguanas in the wild around Soufriere believed these to have been brought in by people deliberately (Figure 28). Specifically, respondents believed pets (17%) escaped from captivity (7%). One respondent held the DuBoulay family responsible for the release.

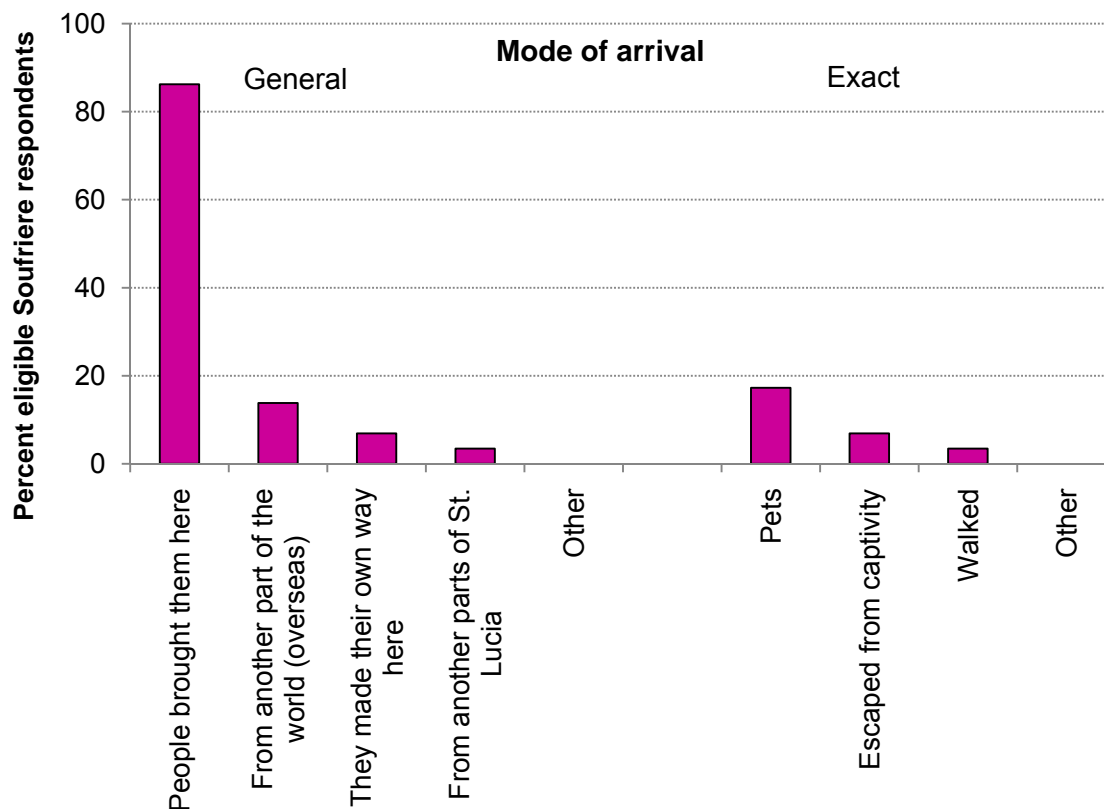


Figure 28: Perceptions on mode of arrival of iguanas to the Soufriere area.

People's views on present and future effects of the iguana in the Soufriere area largely coincided ($\chi^2 \leq 3.52$; Figure 29), although only a subset of respondents were asked about the present effect - those who had been aware of the presence of iguanas in the Soufriere area (Figure 29). Over 70% of respondents were scared of iguanas. Significantly ($P = 0.044$) more women (88%) than men (54%) were presently scared of iguanas, while age group ($P = 0.460$) and job level ($P = 0.581$) had no influence. Sixty-two percent stated that iguanas damaged crops, with no difference between employment groups ($P = 0.610$). Fifty-nine percent of respondents believe iguanas to carry diseases, with no difference between genders ($P = 0.774$).

These concerns were similar for future effects, including the views of those who had not previously been aware of iguanas in the wild around Soufriere. Again, more women (89%) than men (48%) would be scared ($P = 0.002$). But only 44% of respondent feared diseases, and 43% foresaw future crop damage. Present or future concern for biodiversity was low (<3%), as were views of opportunities for tourism or other business (Figure 29).

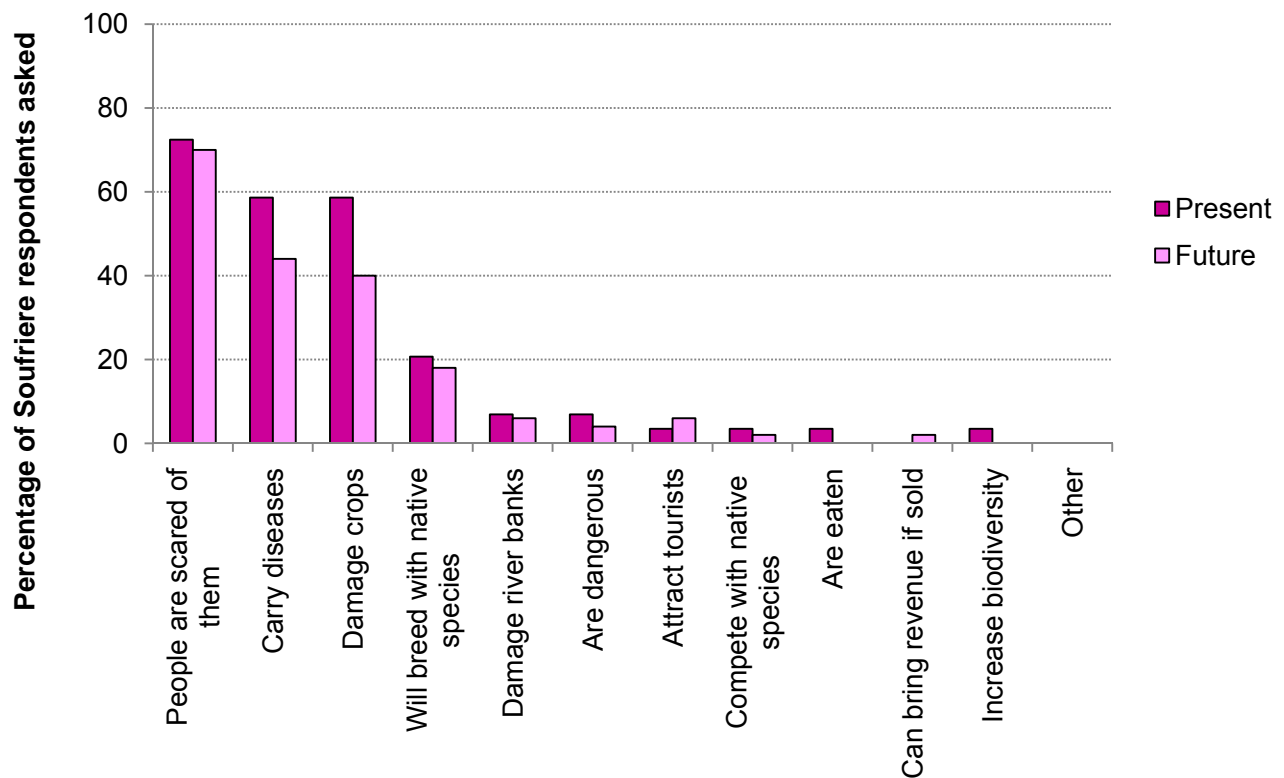


Figure 29: Percentage of respondents asked about present effect of the iguana in the Soufriere area (total: 29 eligible respondents) and future effects (total: 50 respondents).

Similar to general national opinion on the best options to manage IAS, 46% of Soufriere respondents were recommending the removal and destruction of alien iguanas around Soufriere and 20% even the encouragement of residents to kill them. Thirty-six percent had a preference for taking them into captivity (Figure 30). This percentage is markedly higher than the 3% of the general public (Figure 17) and will need addressing in the public education campaign given the proven risks of escape by iguanas from captivity.

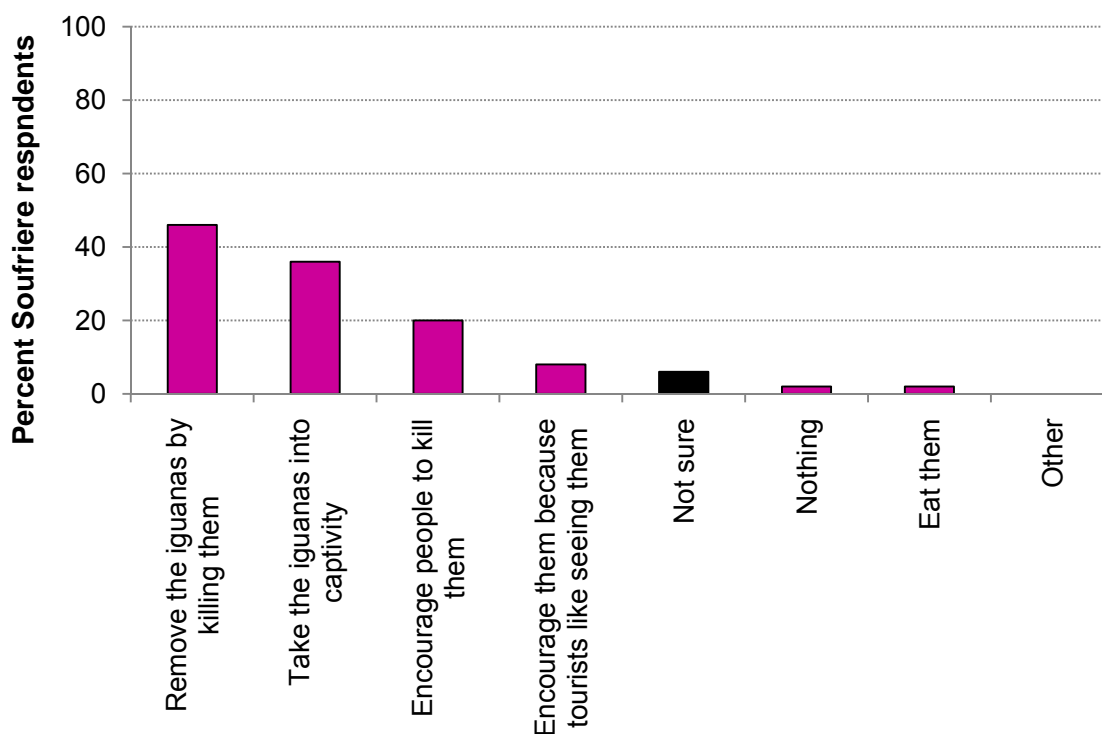


Figure 30: Suggested management options for the alien iguanas in the Soufriere area

References

- [1] Chambers, C.M. & Smith, D. (2007). Environmental Awareness in the OECS: Report of a KAP (Knowledge Attitude and Practice) Survey Conducted in Six Member States. OECS Protected Areas and Associated Livelihoods (OPAAL) Project, Environment and Sustainable Development Unit (ESDU), Organization of Eastern Caribbean States (OECS) Secretariat, Castries, St. Lucia, pp. 191.
- [2] InfoStat (2004). Infostat, versión 2004. Grupo InfoStat, FCA, Universidad Nacional de Córdoba, Argentina.
- [3] John, L. (2001). Attitudes towards Hunting and the Development of a National Wildlife Policy in St. Lucia. Forestry Department, Union, St. Lucia, pp. 31.
- [4] Secretariat of the Convention on Biological Diversity (CBD) (2001). *Assessment and Management of Alien Species that Threaten Ecosystems, Habitats and Species*. Abstracts of keynote addresses and posters presented at the 6th meeting of the Subsidiary Body on Scientific, Technical and Technological Advice, held in Montreal, Canada, 12-16 March 2001. Montreal, SCBD, CBD Technical Paper no. 1, pp. 123.
- [5] St. Marthe, E. (2003). *Biodiversity Awareness Survey Report*. Biodiversity Enabling Activity Project. Ministry of Agriculture, Forestry and Fisheries, Castries, St. Lucia, pp. 75.

Conclusions

- [1] Although St. Lucia has been rated as the OECS country with the highest environmental awareness and there is evidence of local environmental education having an effect, the understanding of biodiversity remains rather limited even among those who have previously been exposed to the term.
- [2] Television, radio and internet were the most important information sources for environmental issues in St. Lucia. Individuals' choice depended on age, job level and location, but not on gender.
- [3] There was significant baseline awareness of the importance of St. Lucia's off-shore islands for the survival of certain plant and animal species among respondents in the Vieux Fort area. However, the exact effect of ridding the off-shore islands of rats and mongooses and subsequently keeping them predator-free was less well understood.
- [4] The risk that these predators may return to off-shore islands previously cleared of them is widely appreciated, as is the fact that humans (deliberate and accidental) are the most likely vector.
- [5] Cultivated species that have been introduced several generations ago are incorrectly viewed as indigenous to St. Lucia. In particular, few were aware of the Asian origin of mango and banana. More worryingly, the highly invasive water hyacinth ranked second in importance as native aquatic organisms in the public opinion. Also the alien iguana was frequently flagged as native.
- [6] While most St. Lucians are familiar with iguanas, there is considerable confusion about their distribution. Few people distinguish the native and the alien iguana and awareness of two geographically separate populations is believed to be very low, even in the Soufriere area, where awareness of the alien iguana was markedly above the national average.
- [7] Observations of those familiar with the alien iguana in the Soufriere area clearly indicate that initial escapes are very likely to have happened more than a decade ago. That subset of the population was also well aware of the fact that these iguanas had been brought into the country as pets and subsequently escaped captivity.
- [8] Iguanas are widely feared, particularly by women. Concrete reasons, such as damage to crops or carrier of disease were not given by all respondents.
- [9] Whereas many respondents could name an IAS, few were familiar with the term or concept of IAS as such. There was also a noticeable disconnect between the principal impact of IAS and the specific effects of IAS respondents had been exposed to. This disconnect was most pronounced at the two pilot sites.
- [10] Across the country, IAS ranked 18th as a perceived threat to terrestrial biodiversity and 21st as a marine threat; they did not feature at all in perceptions of freshwater threats.
- [11] As expected, baseline awareness of the origin or current distribution of the Pacific lionfish was low. However, there was widespread concern about the potential threat posed by lionfish to St. Lucian native fish and biodiversity in general, as well as to human health.
- [12] People were recognised as the main vector for terrestrial IAS, via both deliberate and accidental introductions. Sea and air currents were held responsible for most introductions of aquatic IAS.
- [13] In general St. Lucians are very open to the destruction of IAS and to collaboration with authorities in this respect. However, a significant number of respondents would prefer invasive animals to be taken into captivity rather than being killed, particularly in the Soufriere area.

Recommendations

Strategic recommendations

- [1] As a foundation to the public education campaign, the concept of biodiversity should be reinforced. In particular the Vieux Fort area should be targeted. The widespread misconception of exotic cultivated species being native also needs addressing. Water hyacinth would make a worthwhile plant example, while the alien iguana, tilapia and mongoose would be suitable animal cases.
- [2] The public education campaign should target television, radio and internet as priority media. Television programmes should have as wide a target audience as possible. Web pages should be designed to appeal to young professional adults in particular, while radio should adopt a more traditional style to appeal to a more mature public. In the Soufriere area, the local LIVE 95 and Soufriere Community Radio Station should be made use of for pilot-specific information.
- [3] The current ranking of IAS as a threat to terrestrial and aquatic ecosystems needs to be improved by a public education campaign. The aim is a widespread understanding of IAS being the second most important threat to biodiversity, right after habitat loss. The curriculum should be built around a solid conceptualization of IAS, their effects and dynamics, making use of local and familiar examples.
- [4] The wide-spread constructive attitude of the public toward IAS management by authorities should be cultivated by a transparent information policy.
- [5] While the importance of deliberate (and accidental) human-mediated introductions is widely appreciated for terrestrial IAS, human involvement in the introduction and spread of aquatic alien species will require further clarification.
- [6] The proven risks of taking invasive alien animals into captivity need to be related to the public. In particular, the history of iguana escapes in Soufriere should be exploited: this example enjoys high credibility and can serve to illustrate this lesson nation-wide.
- [7] Constructive possibilities of citizens' active involvement in IAS management should be flagged by the public education campaign.
- [8] The importance of predator-free off-shore islands should be included in an island-wide public education campaign. Baseline knowledge seems sufficient to combine this with an introduction to the concept of meta-populations during the first year of awareness-raising as well as the provision of concrete, practical guidelines as to how best to avoid carrying rats or mongooses to off-shore islands, e.g. accidentally as stowaways.
- [9] The difference between the native and alien iguanas, including their geographically separate distributions, needs to be communicated with clarity. In this context, it cannot be assumed that the meaning of the term "alien" is understood without an explanation.
- [10] The iguana education programme in particular should strive for objectivity to avoid fostering the widespread but poorly rationalized fear of iguanas.

Methodological recommendations

- [1] Encourage Interfacers to seek clarification on unclear answers. This can be done without leading. For example, Question 13 of the general questionnaire (Appendix 1) was misinterpreted to reflect what should be done by authorities rather than the respondent. On

occasions, when it is unclear whether IAS transport was active or passive, clarification should be sought.

- [2] Rephrase question C4-4 (Appendix 1) positively to read: “What effect do rats or mongooses that live on off-shore islands have?” and adjust the answer categories accordingly.
- [3] Compare demographic data of this survey with the results of the 2010 National Census. If needed, adjust sample population in follow-up IAS surveys to aim for maximum representation.
- [4] Interviewers may have to monitor more carefully that they approach people in activities/professions that are representative for the location.
- [5] Once IAS are recognized as a threat to terrestrial and aquatic ecosystems by a larger proportion of the population, additional analyses should be carried out on future data to determine which IAS matter to St. Lucians most and why.

Acknowledgements

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Appendices

Appendix 1: Questionnaires used during baseline survey



INVASIVE ALIEN SPECIES AWARENESS SURVEY

Mitigating the Threats of Invasive Alien Species in the Insular Caribbean - Saint Lucia Component

Preamble and Greeting

Trained Interviewers will work in pairs: one Interfacier and one the Scribe. The Interfacier is the one who talks to the interviewee and must be a fluent Kwéyòl speaker). Interfaciers are to be guided by the questionnaire, which will NOT be shown to the interviewees. This questionnaire also contains instructions for the interviewers in italics; these comments are not to be made aloud. The Interfacier will encourage the respondent to talk freely. The Scribe will assign certain answers to certain categories and fill in the questionnaire. If for some unforeseen reason a questions is not asked or not answered, write “not asked” and “not answered”.

To initiate the interview, the Interfacier will greet the interviewee and introduce the purpose of the survey, without drawing attention to Invasive Alien Species in the opening. The following information is to be shared with the interviewee:

Good day. My name is XXX. I am from the Ministry of Agriculture, Lands Forestry and Fisheries. Saint Lucia is one of five Caribbean island states participating in a four-year project on conservation of biological diversity of the Caribbean, e.g. its flora and fauna on land, in the sea and in freshwater systems. This island-wide survey in St. Lucia aims to identify areas where public awareness-raising and training are most needed, so that tailor-made programmes and curricula can be designed and implemented with the help of this project. Repeat surveys at key project stages will measure the success of such action and assist us in fine tuning future activities.

Our questionnaire comes in three parts: a main questionnaire, which is presented to the general public, and two optional supplements, one of which will be used only for those people living or working near one of the pilot sites, i.e. Vieux Fort – Point Sables Environmental Management Areas or the Soufriere Region (Canaries to Choiseul to Fond St. Jacques).

Your personal information and opinions will be kept confidential. Only processed data will be shared, e.g. how many female house-makers in the district of Dennery had a particular point of view.

INVASIVE ALIEN SPECIES AWARENESS SURVEY

Mitigating the Threats of Invasive Alien Species in the Insular Caribbean - Saint Lucia Component

General Public Survey

Section A: Interviewers' identification

Interfacer: _____

Scribe: _____

Date: _____

Venue of Interview: _____

Section B: Interviewer's observation regarding respondent's details

Female: _____ Male: _____

Age group: (1) <20 _____ (2) 20-39 _____ (3) 40-59 _____ (4) 60 and over _____

Community where residing: _____

Occupation: _____

Section C: Respondent's answers

1) Have you ever heard the term "biodiversity"

Yes _____ No _____

1a) If yes, what does it mean to you?

For the purpose of this survey, we will define it as follows

Biodiversity is the variability among living organisms from all sources (the sea, rivers, land, etc.) and the systems they belong to, .e.g. ecosystems, species and varieties

2.) Please indicate your two most important sources of information on environmental issues
(mark with ① and ②, ① being most important):

- (1) Internet _____ (2) Print media _____ (3) Television _____
(4) Radio _____ (5) School, college _____
(6) Family, friends, neighbours and colleagues _____
(7) Other (please specify) _____

3.) In your opinion, what are the top three threats to the biodiversity in the sea around Saint Lucia?

Top threat: _____

Second: _____

Third: _____

4.) In your opinion, what are the top three threats to the biodiversity of rivers, ravines and ponds in Saint Lucia?

Top threat: _____

Second: _____

Third: _____

5.) In your opinion, what are the top three threats to biodiversity on land in Saint Lucia?
(Only if respondent asks: questions refers to main island and off-shore islands)

Top threat: _____

Second: _____

Third: _____

6.) Can you name three (3) local (native) St. Lucian types of land plants or creatures?
(Only if respondent asks: anything before colonial time counts as native for the purpose of this survey)

7.) Can you name three (3) local (native) St. Lucian types of water plants or creatures?
(Only if respondent asks: marine or freshwater is accepted here)

8.) Have you ever heard the term 'invasive alien species' (IAS)?

Yes _____ No _____

8a) If yes, what does it mean to you?

8b) If no, what do you think it could mean?

For the purpose of this survey, we will define it as follows:

Alien invasive species are exotic (not St. Lucian) species, whose introduction and/or spread threaten biological diversity

9.) In your opinion, do "Invasive alien species" influence Saint Lucian biodiversity?

Yes _____ No _____

9a) If "Yes", name up to three (3) invasive alien species (on land or in water) that affect biodiversity in St. Lucia. How are they affecting biodiversity?

10.) How do you think we can deal with invasive alien species? *(If respondent asks: think of prevention and control. If the respondent covers one but not the other, prompt?)*

11.) How do you think that invasive alien species get into St. Lucia?

12.) How do you think that invasive alien species spread in St. Lucia?

13.) How do you think you could help in preventing or reducing the effect of invasive alien species (e.g. volunteering)?

14.) Use this space to record any other relevant information, comments or queries arising from this interview (use back of sheet to continue, if needed).

Your opinions will be kept confidential. Should you be interested in volunteering for IAS projects in Saint Lucia – or simply to find out more on IAS – you may provide the following information so that we can contact you:

Name: _____

Phone: _____

Email: _____

For more information you could also visit or contact the Invasive Species Coordinator

Dr. Ulrike Krauss
Department of Forestry
Ministry of Agriculture, Lands, Forestry and Fisheries
Union
Tel.: 468 5646/7 (office)
Fax: 450 2287
E-Mail: ulrike.krauss@gmail.com

The Ministry of Agriculture, Lands, Fisheries & Forestry
would like to THANK YOU for taking part in this survey.

INVASIVE ALIEN SPECIES AWARENESS SURVEY

Mitigating the Threats of Invasive Alien Species in the Insular Caribbean - Saint Lucia Component

C4 Pilot Survey

Use this form only for respondents living or working in the Vieux Fort – Pointe Sable area and in conjunction with general part.

C4-1.) Can you name any of Saint Lucia's offshore islands? (*Interviewer to assign answer to one or more categories*)

- | | | |
|--------------------------|--------------------------|---------------------------|
| (1) No _____ | (2) Maria Islands _____ | (3) Rat Island _____ |
| (4) Praslin Island _____ | (5) Dennery Island _____ | (6) Scorpion Island _____ |
| (7) Ramier Island _____ | (8) Rouche Island _____ | (9) Lapins Island _____ |
| (10) Other (name) _____ | | |

C4-2.) Do you think St Lucia's offshore islands are important?

Yes _____ No _____ Not sure _____

a) If yes, why?

b) If no, why not?

- | | |
|--|---|
| (1) An opportunity for tourism _____ | (1) Too small for the land to be productive _____ |
| (2) You can put livestock on them _____ | (2) Too dry _____ |
| (3) Recreation _____ | (3) Too difficult to access _____ |
| (4) Habitat for animals _____ | (4) Not of interest to tourists _____ |
| (5) They are and can easily be kept free from introduced predators _____ | (5) Not many plants or animals live there _____ |
| (6) Other (specify) _____ | (6) Not sure _____ |
| _____ | (7) Other (specify) _____ |
| _____ | _____ |

(Interviewer to assign answer to one or more categories)

C4-3.) Are there any rats or mongooses on Saint Lucia's offshore islands?

Yes _____ No _____ Not sure _____

(Interviewer to tick one OR MORE; strictly speaking the correct answer is Yes and No, because some don't and some [probably] still do – capture info if respondent should comment on this fact)

C4-4.) What effect does it have if an offshore island has no rats or mongooses?

Positive effect _____ Negative effect _____ Not sure _____

a) If positive, why?

b) If negative, why?

(1) More plants or animals can survive _____

(1) There will be more snakes _____

(2) Species found nowhere else on Saint

(2) There must be something wrong with the island

Lucia can survive there _____

(3) Nicer places to visit _____

(3) Not sure _____

(4) More likely to attract tourism _____

(4) Other (specify) _____

(5) Not sure _____

(6) Other (specify) _____

(Interviewer to assign answer to one or more categories)

C4-5.) Could rats get back onto offshore islands, assuming that there are no rats present at the moment?

a) Yes _____ No _____ Not sure _____

b) If yes, how? (Interviewer to assign answer to one or more categories)

(1) People transport them there deliberately _____

(2) People transport them there accidentally _____

(3) Rats stowaway on boats and jump off on the offshore islands _____

(4) Rats swim there _____

(5) People leave garbage there that makes the offshore islands more attractive to rats _____

(6) Other (specify) _____

C4-6.) Have you ever heard of the lionfish?

a) Yes _____ No _____ Not sure _____

(If “No” or “not sure”, show a picture)

C4-7.) Where do lionfishes occur? (Interviewer to assign answer to one or more categories)

- (1) St. Lucia _____ (2) Other parts of the Caribbean _____
(3) Throughout Caribbean _____ (4) Asia _____
(5) Not sure _____ (5) Other (specify) _____

C4-8.) In your opinion, what effect can exotic (foreign) fish have on biodiversity in St. Lucia if they are introduced? (Interviewer to assign answer to one or more categories)

- (1) No effect ----- (2) Increase biodiversity _____ (3) Attract tourists _____
(4) Decrease biodiversity _____ (5) Scare tourists away _____ (6) Enrich diet _____
(7) Eat our local fishes _____ (8) Cause injury or poisoning _____ (9) Not sure _____
(10) Other (specify) _____

C4-9.) In your opinion, how could land IAS find their way into St. Lucia? (Interviewer to assign answer to one or more categories)

- (1) People transport them there deliberately _____
(2) People transport them there accidentally _____
(3) Stowaway on aircrafts or boats _____
(4) Water or air currents _____
(5) Other (specify) _____

C4-10.) In your opinion, how could lionfish or other water IAS find their way into St. Lucia? (Interviewer to assign answer to one or more categories)

- (1) People transport them there deliberately _____
(2) People transport them there accidentally _____

(3) Stowaway on aircrafts or boats _____

(4) Water or air currents _____

(5) Other (specify) _____

Thank you!

INVASIVE ALIEN SPECIES AWARENESS SURVEY

Mitigating the Threats of Invasive Alien Species in the Insular Caribbean - Saint Lucia Component

C5 Pilot Survey

Use this form only for respondents living or working in the Soufriere area and in conjunction with general part.

C5-1.) Do you know what an iguana (*Iezar*) is?

Yes _____ No _____ Not sure _____

(If "No" or "not sure", show a picture)

Where can you find iguanas in St. Lucia?

C5-2.) Are there any iguanas living in the Soufriere area in the wild (outside of cages)?

Yes _____ No _____ Not sure _____

If Yes, go to C5-4

Otherwise say there are and go to C5-7

C5-3.) How long have they been there for (in the wild)? (*Interviewer to assign answer to category*)

(1) Last few years _____ (2) More than 10 years _____

(3) Always _____ (4) Not sure _____

C5-3 a) How do you think they got there? (Interviewer to assign answer to one or more categories)

(1) From another part of St. Lucia _____ (2) From another part of the world (overseas) _____

(3) People brought them here _____ (4) They made their own way here _____

(5) Other (specify) _____

C5-3 b) How exactly? (Interviewer to assign answer to one or more categories)

- (1) Pets _____ (2) Escaped from captivity _____ (3) Walked _____
 (4) Swam _____ (5) Other (specify) _____ (6) Not sure _____

C5-4.) What effect do they have on people or biodiversity in St. Lucia at present?
(Interviewer to assign answer to one or more categories)

- (1) Damage crops _____ (2) Damage drainage systems _____
 (3) Damage river banks _____ (4) Carry diseases _____
 (5) People are scared of them _____ (6) Are dangerous (if ticked: how?) _____

 (7) Will breed with native species _____ (8) Increase biodiversity _____
 (9) Attract tourists _____ (10) Are eaten _____
 (11) Make good pets _____
 (12) Compete with native species (e.g. for food or living space) _____
 (13) Other (specify) _____

C5-5.) What effect may they have on people or biodiversity in St. Lucia in the future?
(Interviewer to assign answer to one or more categories)

- (1) Damage crops _____ (2) Damage drainage systems _____
 (3) Damage river banks _____ (4) Carry diseases _____
 (5) People are scared of them _____ (6) Are dangerous (if ticked: how?) _____

 (7) Will breed with native species _____ (8) Increase biodiversity _____
 (9) Attract tourists _____ (10) Enrich diet _____
 (11) Make good pets _____ (12) Can bring revenue if sold _____
 (13) Compete with native species (e.g. for food or living space) _____

(14) Other (specify) _____

C5-6.) What do you think should be done about iguanas in the Soufriere area? (*Interviewer to assign answer to one or more categories*)

- (1) Nothing _____ (2) Encourage them because tourists like seeing them _____
(3) Encourage them because I like seeing them _____ (4) Protect crops with fences _____
(5) Remove the iguanas by killing them _____ (6) Take the iguanas into captivity _____
(7) Eat them _____ (8) Encourage people to kill them _____
(9) Encourage people to eat them _____ (10) Not sure _____
(11) Other (specify) _____

Thank you!

Appendix 2: Participants in Training Workshops

Participant	Department	1 st Workshop, 22 April	2 nd Workshop, 17 May
Adam Mitchel	Forestry	✓	✓
Allena Joseph	Fisheries	✓	-
Alwin Dornelly	Forestry	✓	✓
Andree J. Theophilus	Fisheries	✓	-
Augustus Joseph	Forestry	✓	✓
Bert Xavier	Forestry	✓	✓
Carnice Peterson	Forestry	✓	✓
Charmain Augustine	Forestry	✓	✓
Chris Sealys	Forestry	✓	✓
Feria Narcisse	Forestry	✓	✓
Gloria Mortley	Forestry	✓	✓
Jeanette Victor	Forestry	✓	-
Julius Georges	Forestry	✓	✓
Karl Augustine	Forestry	✓	✓
Luvina Simon	Fisheries	✓	✓
Margaret Severin	Forestry	✓	✓
Mary James	Forestry	✓	-
Mathurin James	Forestry	✓	✓
Melissa Gabriel	Fisheries	✓	✓
Nicole LaForce	Forestry	✓	-
Odetta James	Forestry	✓	✓
Patrick Charles	Forestry	✓	✓
Rita Harrison	Fisheries	✓	✓
Theodor Nicolas	Forestry	-	✓
Timotheus Jn. Baptiste	Forestry	✓	✓
Ulrike Krauss	Forestry	✓	✓