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LIVING CONSERVATION

Market research report: Environmental monitoring and software use by oil palm growers

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BACP Deliverable: Results of market research on suitability of the various software and databases in current use, and ideal method for dissemination and uptake.
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Executive summary

Market research conducted by ZSL between February and April 2012 indicates that current environmental monitoring of HCV areas within oil palm plantations is limited and so too is the use of basic software to store and analyse data. This research reflects current criticism of the RSPO by NGO groups and the media, who argue that membership reporting requirements, especially with regard to environmental monitoring and management, are inadequate. Monitoring is widely seen as a necessary part of successful management however there is little capacity at growers level to develop standardised monitoring protocols and limited scientifically robust evaluation of management practices.

Despite the availability of environmental monitoring software designed specifically for the agricultural sector, usage amongst palm oil growers is virtually non-existent. This can be attributed to limited knowledge of the software systems available and a lack of technical and financial capacity to make use of them. A practical, easy to use and comprehensive software programme for data storage, analysis and output would improve monitoring, analysis and reporting. It would also encourage communication and integrated management within companies, enabling better management practices. Scientifically rigorous data analysis that produced clear, reliable outputs would also improve reporting and provide growers with a format for communicating their progress, thereby generating positive publicity and increasing demand for CSPO.

The market research conducted for this report, via semi structured interviews and questionnaires, recommends that to successfully deliver the monitoring protocol and software so as to ensure uptake and usage amongst oil palm growers, software developers should:
- Provide a modular software package, which offers a basic database and analysis tool and subsequent add-ons for more sophisticated and complex data entry and analysis.
- Provide a software programme that produces clear, informative outputs for senior management including GIS maps, graphics and numerical data as well as prescriptive HCV management recommendations.
- Provide monitoring and software training to field and sustainability teams as well as training in interpreting outputs for management.
- Training must be phased, allowing companies to progressively build capacity and move from basic monitoring to more sophisticated monitoring and analysis.
- Limit the costs of monitoring training and software support.
- Engage in a marketing strategy that targets Malaysian and Indonesian growers and raise awareness of available tools from the start in areas of new development such as West Africa.
- Successfully communicate the benefits of environmental monitoring and reporting to companies in relation to costs.

Introduction

Purpose and mission

Membership of the Roundtable on Sustainable Palm Oil (RSPO) continues to increase and diversify, yet so too does the threat to its credibility. This can be partly attributed to the absence of a transparent mechanism by which recommended management actions amongst members are evaluated and reported. Monitoring is widely seen as a necessary part of successful management, however the current requirements for structured reporting of monitoring results are weak and there is little capacity at plantation level to develop standardised monitoring protocols in-house. Recent attempts to develop a structured mechanism have as yet been unsuccessful. The Zoological Society of London (ZSL) therefore will use a collaborative approach, utilizing its working relationships with oil palm growers to develop a practical, impartial and scientifically rigorous monitoring protocol.

In conjunction with this monitoring protocol, ZSL will develop a software programme that will store and analyse the environmental monitoring data collected and generate a range of clear and reliable outputs to inform and influence better management practices. The patrol and staff management elements of the software itself will be adapted from the highly successful ZSL M-stripes software currently used by patrol teams in protected areas in India and Nepal and will be adapted to meet plantation HCV requirements.

In order to develop this software, a better understanding of current monitoring practices and software use by oil palm growers in Malaysia and Indonesia is needed. This report describes and discusses the results of market research carried out by the ZSL's Biodiversity and Oil Palm Project between February and April 2012. The results of this research will then feed in to the brief for the environmental monitoring protocol and software. The key objective of this market research report is to feed in information at each stage of the software development process by:
- Providing information on current data collection and storage by environmental monitoring staff.
- Assessing current levels of data analysis within oil palm companies.
- Understanding data reporting and presentation requirements of oil palm companies and the RSPO.
- Establishing the current level of HCV training and software usage amongst environmental monitoring staff.
- Determining the best mechanisms for software delivery in order to encourage uptake and usage.

Situational analysis

Background information:

A growing awareness of the need to promote and provide sustainable palm oil led to the conception of the Roundtable on Sustainable Palm Oil (RSPO) in 2004. Initially growers and processors dominated membership; they understood that

in order to continue exporting to western markets they would need to improve environmental practices. However, as consumer pressure mounts for sustainably sourced products, membership of consumer goods manufacturers and retailers also increased. In 2011 membership of manufacturers and retailers had grown by 60% and 50% respectively (RSPO 2011).

Twenty-nine grower companies are currently certified as in compliance with the RSPO principles and criteria (RSPO P&Cs). This represents an area of 1,130,968 ha of oil palm with a production capacity of 5.6 metric tonnes of Certified Sustainable Palm Oil (CSPO). Supply of CSPO has increased by 250% since 2009 whilst sales volume has increased by 620%. However, whilst demand is increasing, so is supply. There is currently a great disparity in production and sales resulting in a surplus of CSPO. With 4,798,512mt of CSPO produced in 2011 and only 2,490,526mt sold, many growers have lost out on the CSPO price premium as certified palm oil is then sold at a non-certified price (RSPO Secretariat Sdn Bd, 2011).

However, it is hoped that demand for CSPO is will rise with increased consumer awareness of sustainability issues. As consumers look to the RSPO for guidance towards the most sustainable products via their new trademark label, the RSPO needs to ensure strict member compliance via more accurate and transparent reporting systems. Organisations such as Greenpeace as well as other media and civil society organisations remain doubtful of the RSPOs ability to achieve its goal to mitigate negative impacts on biodiversity and ecosystem services. Without a system for standardised and accurate reporting the arguments against the RSPO will still stand.

The requirement to identify, maintain and enhance High Conservation Values (HCVs), that may be affected by existing or new oil palm developments (P&C 5.2 & 7.3 of RSPO Principles & Criteria for Sustainable Palm Oil Production, 2007) has been identified, as one of the most complex and difficult aspects of the P&Cs. Establishing a practical and informative system for monitoring the progress of management will improve conservation and enhancement of HCV areas. Accurate and consistent monitoring and records will also provide the RSPO and growers with quantitative data to demonstrate compliance to P&C 5.2 .

The RSPO must demonstrate its ability to significantly reduce the negative environmental and social impacts associated with oil palm. It must also ensure that certified producers are given sufficient guidance to implement the P&Cs and that uncertified growers can clearly see the requirements and incentives to becoming a certified member.

Product and market analysis:
The palm oil market is made up of a number of different stakeholder categories. The oil palm companies that control the production end of the supply chain can be divided into two key groups. The first group is made up of large companies such as Golden Agri Resources, Wilmar and Sime Darby with land banks in the hundreds of thousands of hectares. They employ intensive, well-managed high tech practices and produce a large percentage of the palm oil traded

internationally. Certain larger producers are also beginning to expand operations into Western Africa and it is therefore key that best practices are learned and institutionalised now so as to avoid environmental damage and losses to biodiversity in these new regions. Having a monitoring protocol and software programme that can be easily adapted from the outset is of practical use.

The second group is made up of a number of smaller companies with land banks between 10,000-30,000 ha, such as SIPEF and PT Agro Lestari. Both small and large companies are under pressure to improve their environmental track records, through improved practices and accountability. In order to protect their public image and satisfy western markets many of these companies have become members of the RSPO and are improving practices based on the RSPO P&Cs. However, smaller companies often have fewer technical and financial resources available to them to fulfil these criteria than larger companies.

Research shows that there are a range of environmental software programmes and databases available to growers online, which are designed to simplify and facilitate environmental monitoring, such as EDAS2 and Geotech. These are available to purchase or as free open source resources. Programmes range from simple software for data storage and analysis to complex systems that enable storage of multiple data sets, complex analysis and the generation of GIS maps and graphics.

A range of freely available open access statistical analysis programmes can be found online. These are utilised by ecologists and conservationists internationally and carry out specific tasks such as calculating diversity indices and species rarity indices. For example EstimateS is a free software application that uses biotic sampling data to compute a range of biodiversity functions, estimators, and indices. CARE (CApture-Recapture), SECR and SPADE (Species Prediction And Diversity Estimation) are also examples of open access resources. It is important to include scientifically rigorous levels of analysis within the software developed but it is even more important to determine the technical capacity of environmental monitoring teams using the software and provide training if capacity is limited.

There are also a number of programmes that have been developed specifically to assist the agricultural sector in environmental monitoring and managing. Products such as EDAS2, which is an open source project for the web-based management, analysis, and exchange of environmental data and Geotech, which provides data management and GIS tools for managing, mapping, and analysing laboratory and field data for water, soil, air etc. These programmes allow data storage, analysis and generate various outputs. They are designed and structured to be much more user friendly and are therefore often available to purchase via subscription or for a one-off fee. Many of these programmes have been developed for the American and European markets. This research will assess whether they have also penetrated the Indonesian and Malaysian markets. Large agricultural companies in developed countries often employ high-tech agricultural systems and have well-trained IT departments dealing

with data storage and analysis. Standards of education and knowledge of IT may be a lot higher than in developing countries in Asia.

Market analysis indicates that some of the software programmes available to purchase offer technical support, either online or in person. Whereas the free open source programmes do not. In some instances the free programmes will offer limited assistance through an online Q&A forum. Many of these packages are modular and begin with a basic system to which extra modules such as GIS can be purchased and added-on. Building a programme with add-ons allows the software to be as simple and complex as you wish and considering the variation in technical capacity and resources of oil palm growers this is something to be considered when developing the ZSL HCV monitoring software.

Analysis of the environmental monitoring software packages currently available identified useful features as well as highlighting factors that potentially limit uptake when developing a new software package for palm oil producers.

Methods

Qualitative research:

Semi-structured interviews were conducted with representatives from oil palm companies including Sime Darby, Bumitama Gunajaya Agro, PT Agro Harapan lestari, Bisma Dharma Kencana, PT Astra Agro Lestari Tbk and SIPEF. Interviews with growers from the oil palm sector were mostly with senior level management and sustainability departments. The companies interviewed varied in size from small concessions of 20,000 ha to larger companies with land banks of hundreds of thousands of hectares. Technical information was also gathered from SIPEF and Wilmar, the two grower companies hosting the field trials of the monitoring protocol and software. The information detailed current monitoring practices, data and analysis.

In addition a range of NGOs and consultancy firms including Daemeter, the RSPO, Copenhagen Zoo, WWF and Wetlands International were contacted. Interviews were arranged with local organisations whereas members of the RSPO eNGO group and representatives from the HCV network were emailed with a list of broad, discursive questions that were designed to draw out insights into the current environmental standards and monitoring capacity amongst oil palm growers as well as recommendations for data collection and analysis.

Quantitative research:

ZSL is working closely with two oil palm growers of differing sizes and technical capacities to trial the monitoring protocol and software. However, research was expanded to include other companies and a market research questionnaire was created to evaluate current monitoring practices and software use amongst a range of growers. The survey consisted of short, closed questions designed to encourage participation. The questionnaire was initially distributed to attendees at the iCOPE conference in Bali on the 22nd February 2012 in hard copy format. After the conference the survey was then transferred to an online format using Survey Monkey and emailed to grower members of the RSPO for their input. Reminder emails were sent out and phone calls conducted to encourage participation. After consultation with the RSPO secretariat it was decided that response levels might be improved if the survey was translated into Indonesian. The survey was then translated and the link sent out via email by the RSPO to emphasise RSPO backing and encourage participation. In total we received 24 responses.

The growers survey can be accessed via the following link:
 https://www.surveymonkey.com/s/MT6LCF2

Results

Qualitative research

Analysis of semi-structured interview responses indicated two central themes: capacity & technical difficulty and cost & management buy in.

Capacity & Technical difficulty:

The technical knowledge and resources that would enable advanced environmental monitoring and management practices within companies is currently limited. Monitoring within HCV areas is not carried out on a regular basis and is limited within plantations themselves, but factors such as palm health/leaf-fall index that impact palm productivity are often recorded. HCV areas themselves are ecologically very varied, ranging from peat lands to grasslands, however there is little ecological knowledge within field teams and little training available to help improve it.

There is an absence in the market of a clear, easy-to-use and prescriptive monitoring protocol and software. Therefore, there is a willingness to participate in the protocol and software development process and make use of the final product. There is recognition that companies cannot continue to out-source environmental responsibilities to consultants. The costs of hiring consultants on a regular basis are substantial and businesses are looking to build capacity in-house. Reports of consultancy firms producing weak HCV assessments and spending insufficient time conducting research on the ground have emerged. This reduces availability of accurate baseline data and limits monitoring.

There is currently limited use of databases and software amongst smaller oil palm growers and most data is still stored in hard copy. Many smaller companies have also avoided the costs of investing in complete GIS systems by using free software such as map info. Larger companies have developed simple database systems in-house that use excel and have greater experience of software use however uptake of sophisticated systems is still limited. There is also a poor understanding and knowledge of available software systems. Specialist consultants are often employed for monitoring requiring sophisticated technical analysis. Patrol teams may have only a basic level of education; they have limited understanding of English and often identify species by their local names. Some respondents stated that the technical language used in the current HCV toolkit limits understanding and uptake.

Cost and management buy in:

Research indicated that there is poor bottom up communication with senior level management that results in a lack of understanding of environmental monitoring and management and limited buy in to the sustainability agenda. There may also be limited understanding at the field/patrol team level as to the purpose of monitoring because they have little involvement in data analysis and output, which is predominantly undertaken by sustainability teams. Human factors have a large impact on the success of monitoring and management therefore it is important that ZSL not only delivers a monitoring and analysis tool but tackles knowledge and communication issues in training as well. Data

protection is important amongst growers, especially industry leaders. Plantation management have access to data from all plantations whereas estates are given access to estate data only.

Management often categorise projects as 'money spending' or 'money earning'. Environmental management is rarely part of any plantation managers' key performance indicators which focus predominantly the yields from fresh fruit bunches. Budgets for environmental management are also limited; 60-70% of plantation budget is spent on fertiliser. The protocol needs to be seen to be providing benefits such as improvements in ecosystem services or feeding into the companies' sustainable image and providing access to foreign markets rather than simply being an exercise in money spending. The reports generated from the monitoring protocol and software will show that growers are meeting their commitments as RSPO members and moving towards certification for the plantation.
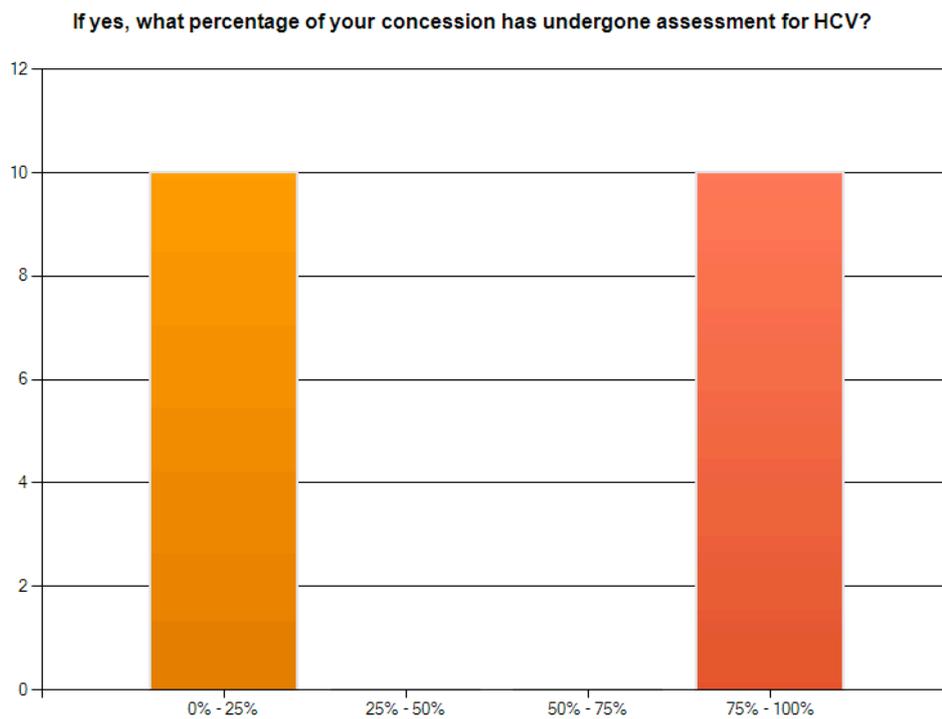
Quantitative Research

Respondents:

The growers survey received twenty-four responses.

Responses predominantly came from head office or sustainability teams. There were limited responses from field teams or IT departments. Figure 1 shows that responses came from a range of company sizes. Twenty-one of the respondents had HCV areas present in their concession. Of the areas designated as HCV, only eight companies were carrying out monitoring on 100% of their HCV areas. The rest were monitoring below 50% of their HCV areas (see figure 3).
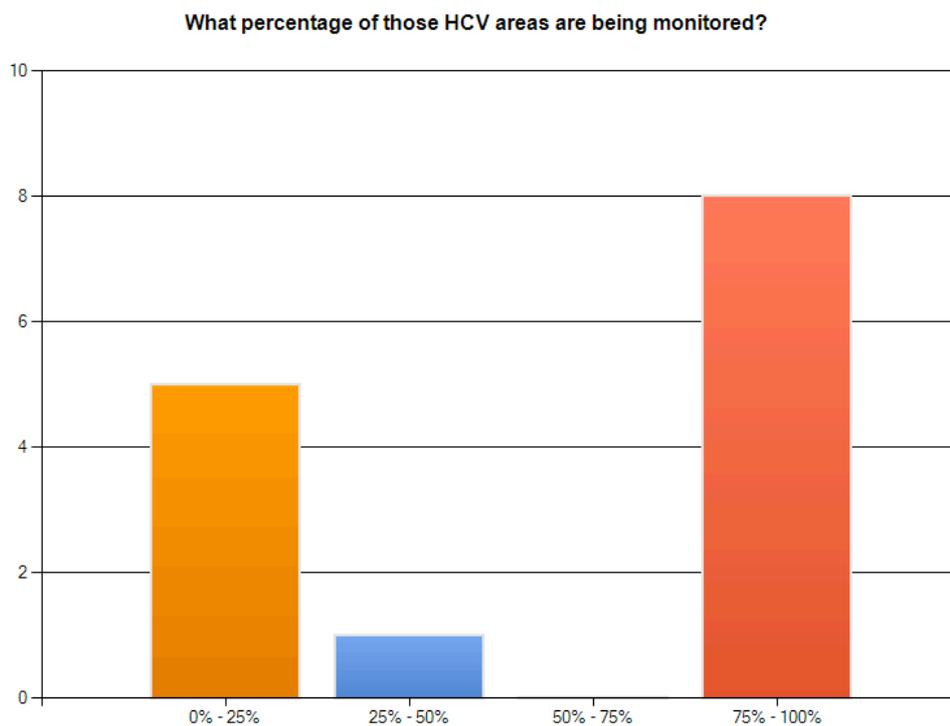
Figure 1: Size of company concession

What is the total size of all the concessions owned by your holding company?
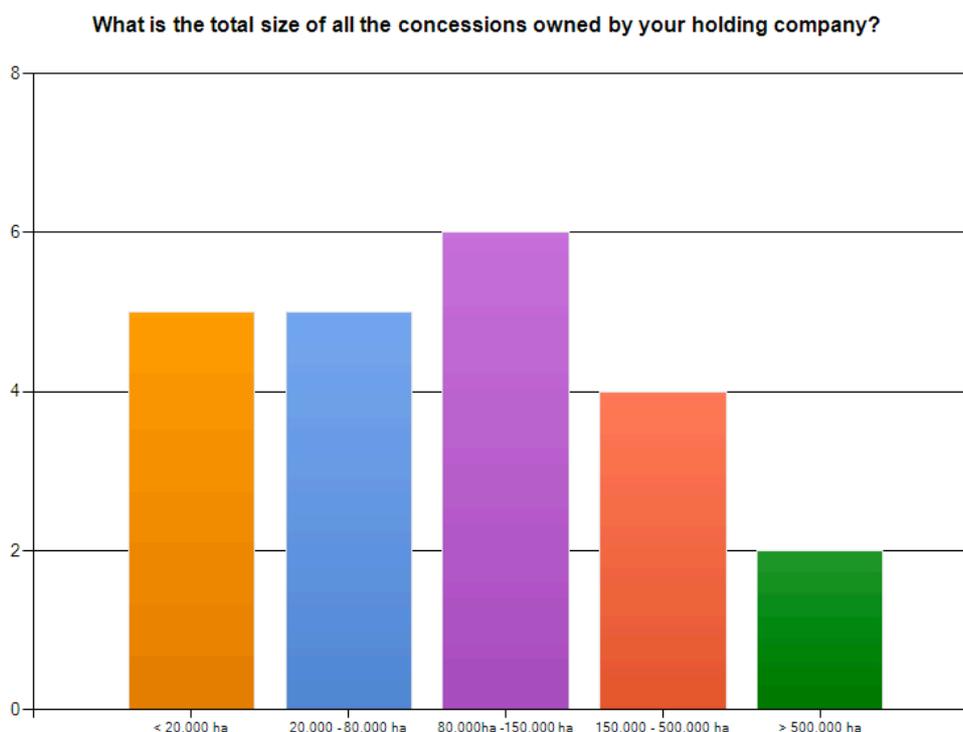
Figure 2: Percentage of concession that has undergone HCV assessment

If yes, what percentage of your concession has undergone assessment for HCV?

Figure 3: Percentage of HCV areas undergoing monitoring

What percentage of those HCV areas are being monitored?

Budget:

Eight respondents chose to disclose how much of the companies annual budget was spent on environmental monitoring. Of the four that answered as a percentage of annual revenue the results indicated anywhere between 2 - 25%.
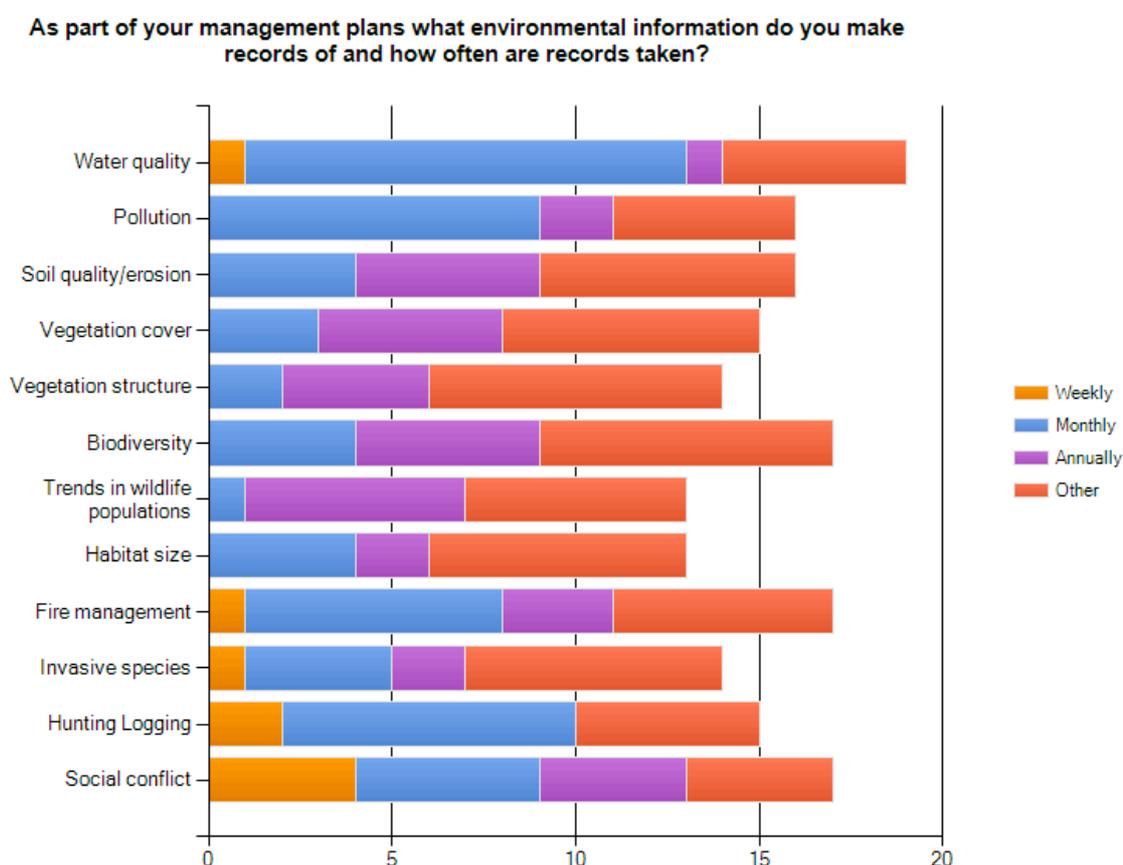
Two respondents estimated total annual spend in US Dollars to be US$ 200,000 – 250,000. Whereas another two respondents stated that no budget had been allocated to environmental monitoring.

Current environmental monitoring practices:
Figure 4 illustrates that water quality, pollution, soil quality, biodiversity, fire management and social conflict monitoring is carried out most frequently by the most respondents. However monitoring frequencies varied greatly. A large number of respondents indicated that monitoring was carried out infrequently or on an ad hoc basis.

Trends in wildlife populations, habitat size, vegetation structure and cover, invasive species and hunting and logging were monitored by fewer than fifteen respondents and mostly at an annual or ad hoc basis.

Figure 4: Current environmental monitoring undertaken and frequency with which it is carried out.

As part of your management plans what environmental information do you make records of and how often are records taken?

In-house sustainability teams are predominantly responsible for analysis of environmental information (Figure 5) but there was great variation in the frequency of analysis of environmental monitoring information (Figure 6).

Figure 5: Teams responsible for analysis of environmental monitoring data

Currently who is responsible for analysing the environmental monitoring information collected?
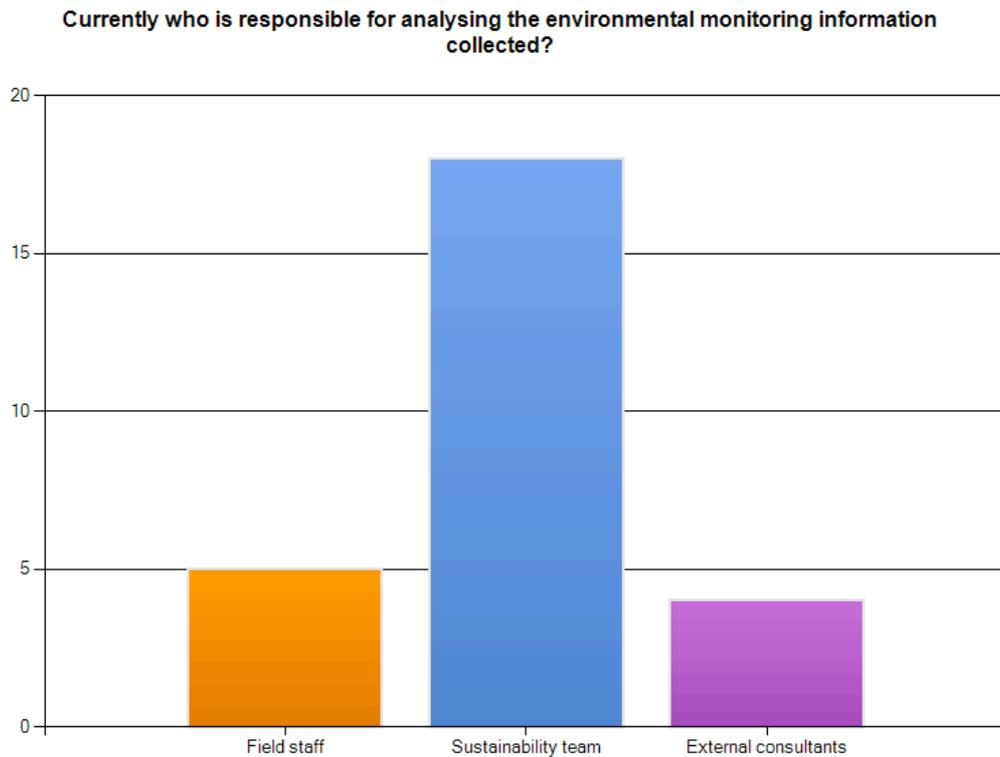
Figure 6: Frequency of environmental data analysis

How often is environmental monitoring information analysed?
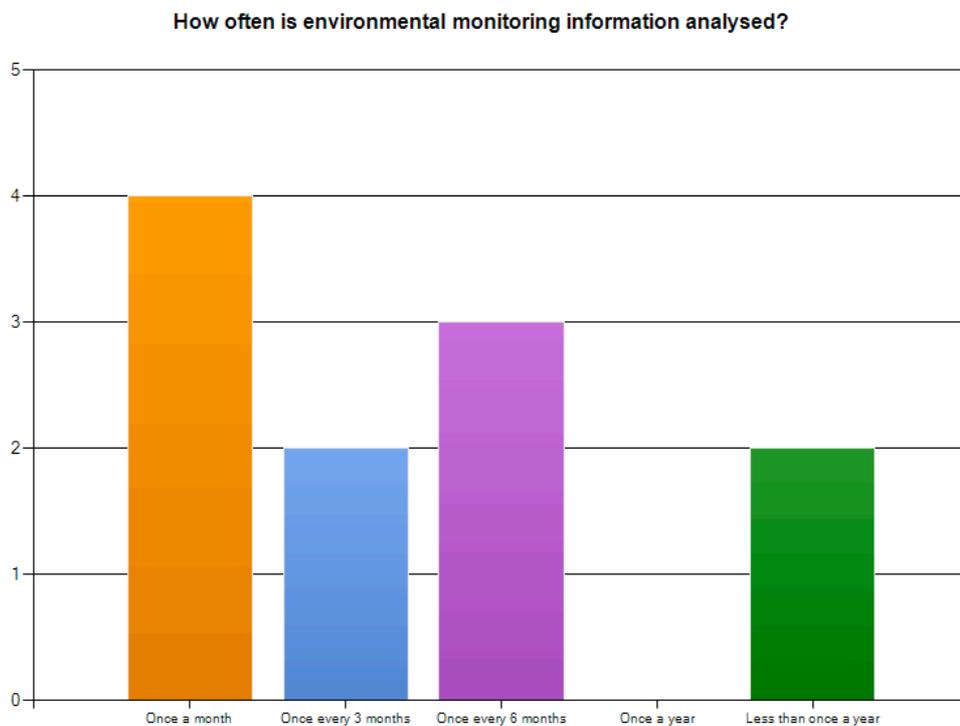
The questionnaire indicated that environmental monitoring results are delivered predominantly via reports as well as meetings and presentations (Figure 7)

Figure 7: Mode of delivery of environmental data to senior management

How are environmental monitoring results delivered to senior management?
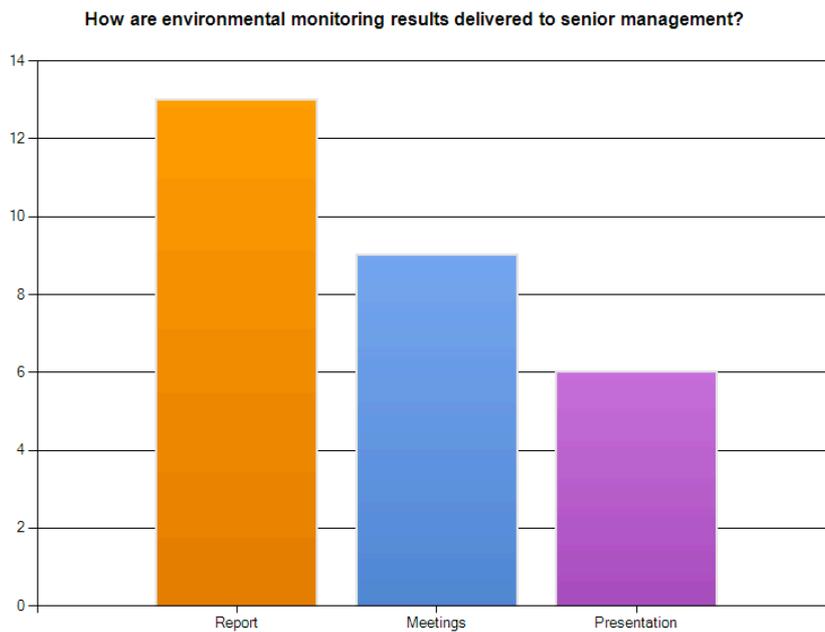
Results indicated that teams responsible for environmental monitoring ranged between 0-13 members, with the average being between 3-5. Only four respondents indicating that they had more that thirteen people carrying environmental monitoring (Figure 8). The majority of environmental monitoring staff had a bachelors degree with only three respondents indicating that the majority of their staff had a masters degree. One respondent chose to comment that some of their field staff only had school education with some basic environmental training.

Figure 8: Number of staff responsible for environmental monitoring

How many staff in your concession are responsible for environmental monitoring?
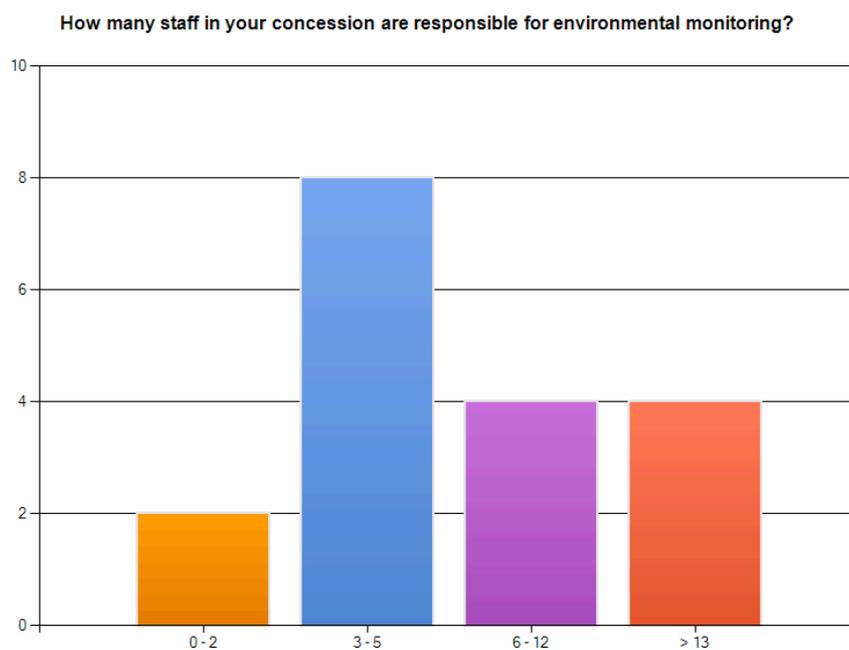
HCV monitoring protocol and software:

The number of staff with HCV training was roughly evenly divided (figure 9), however seventeen respondents out of 24 stated they would be interested in enrolling their staff in HCV training. Two said they were not interested in enrolling their staff in training, with one commenting that this was because current field monitoring was sufficient.

Figure 9: Number of staff with HCV training

Does your environmental monitoring staff currently have HCV monitoring training?
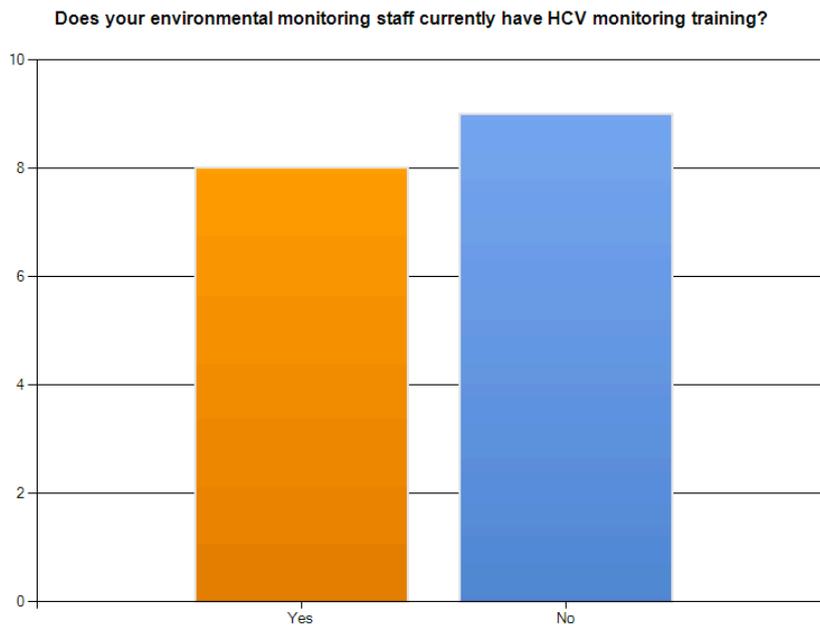
Figure 10: Respondents interest in enrolling their staff in environmental monitoring training

Would you be interested in enrolling your field staff in an environmental monitoring training course?
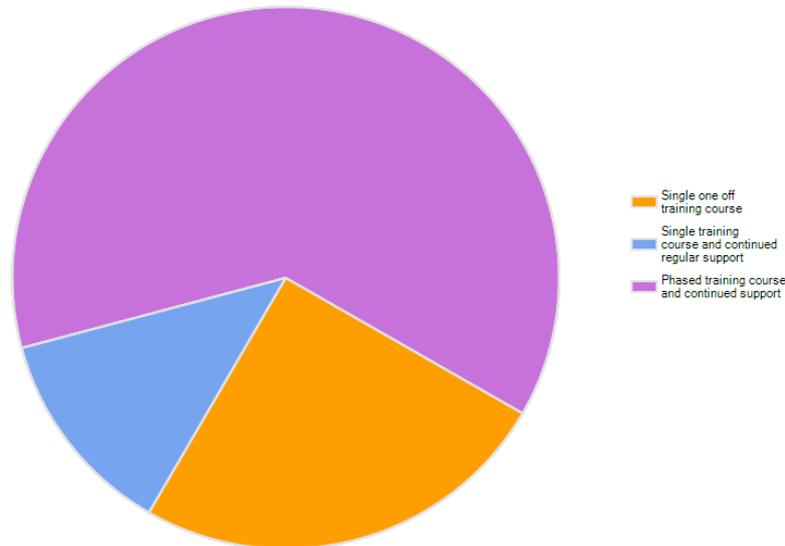
Figure 11 shows that of the seventeen that said they would be interested in enrolling in an HCV training course, 62% stated they would prefer a phased

training course with continued support. Respondents commented that it would depend on the cost of training and that some would be happier to train in-house.

Figure 11: Preferred method of delivery for environmental monitoring training

Seventeen respondents said they would be interested in using monitoring software in their concession (Figure 12). Figure 13 illustrates that of these seventeen there was a large amount of variation with regard to how the software should be distributed with 35% requesting free software with no support and 65% requesting training or support. 50% of those requesting training or support stated they would like to pay for this via annual subscription (Figure 14).

Figure 12: Respondents interest in use of environmental monitoring software

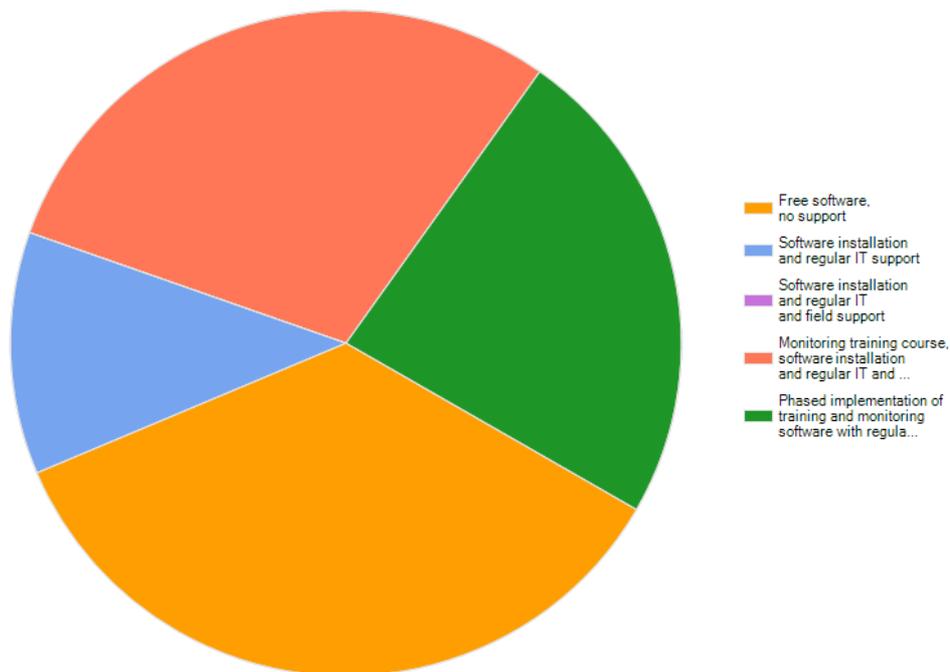**Figure 13: Preferred method of delivery of environmental monitoring software**

If yes, how would you like this to be delivered?

- Free software, no support
- Software installation and regular IT support
- Software installation and regular IT and field support
- Monitoring training course, software installation and regular IT and ...
- Phased implementation of training and monitoring software with regula...

Figure 14: Preferred method of payment for training and support

If yes, to training and support, how would you like to pay for this service?

- One off payment
- Annual subscription
- Site licenses for each concession
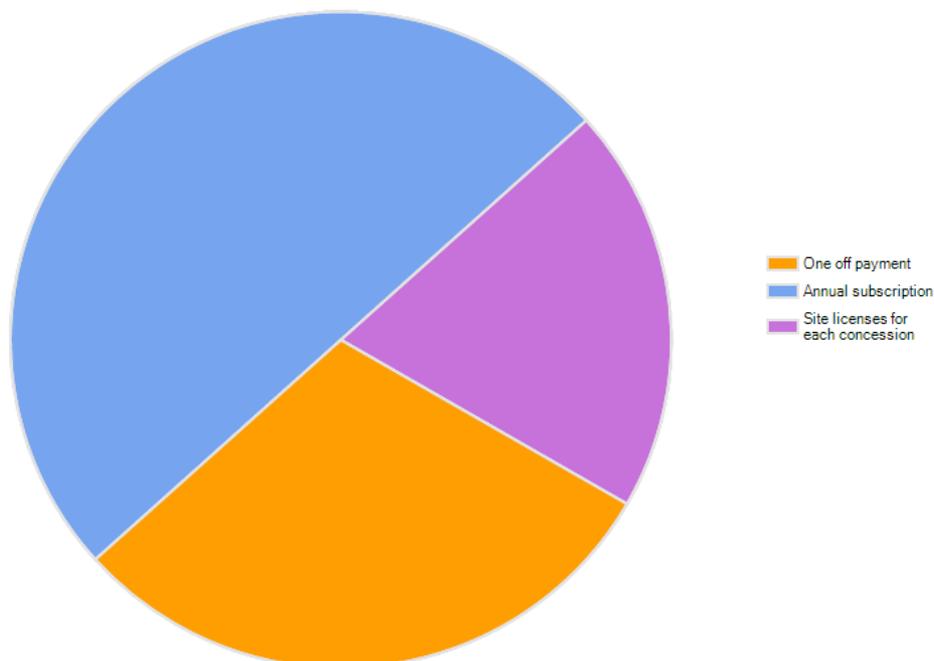
'Ease of use' and 'level of data entry and output' were rated as the most important factors with regard to the monitoring software. 'Flexibility & performance' was less important and 'cost' was rated as the least important factor, which is surprising as previously 35% (figure 13) of respondents said

they didn't want to pay for the software. GIS maps and numerical data were indicated to be the most useful elements of the software whereas graphics, statistical analysis and population modelling were rated less useful (Figure 15).

Figure 15: Aspects of environmental monitoring software rated by importance
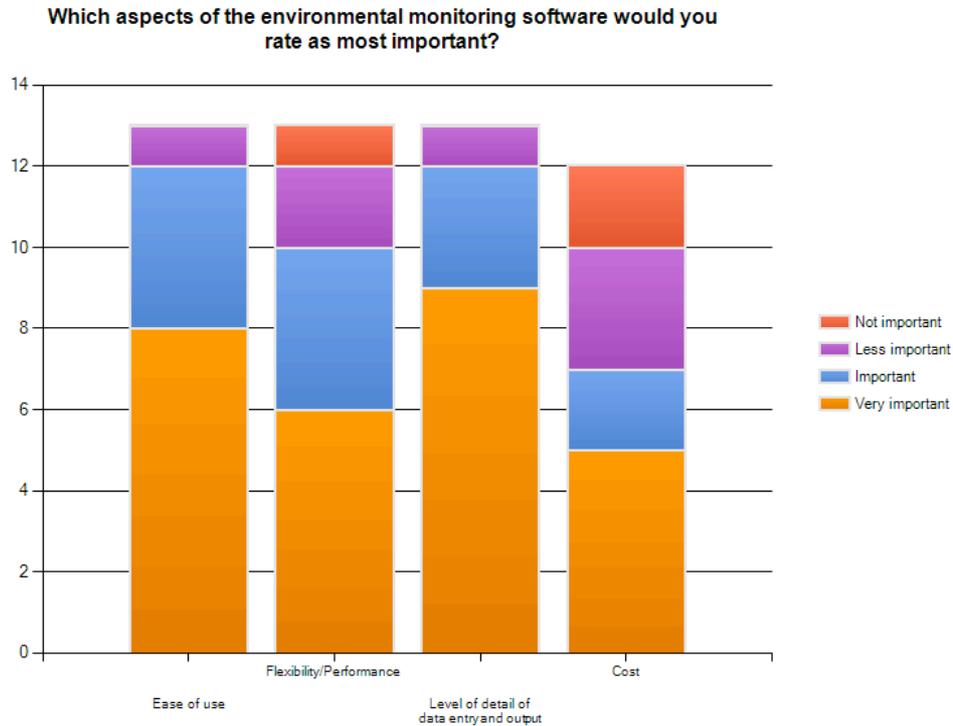
Figure 16: Features of environmental monitoring software rated by usefulness
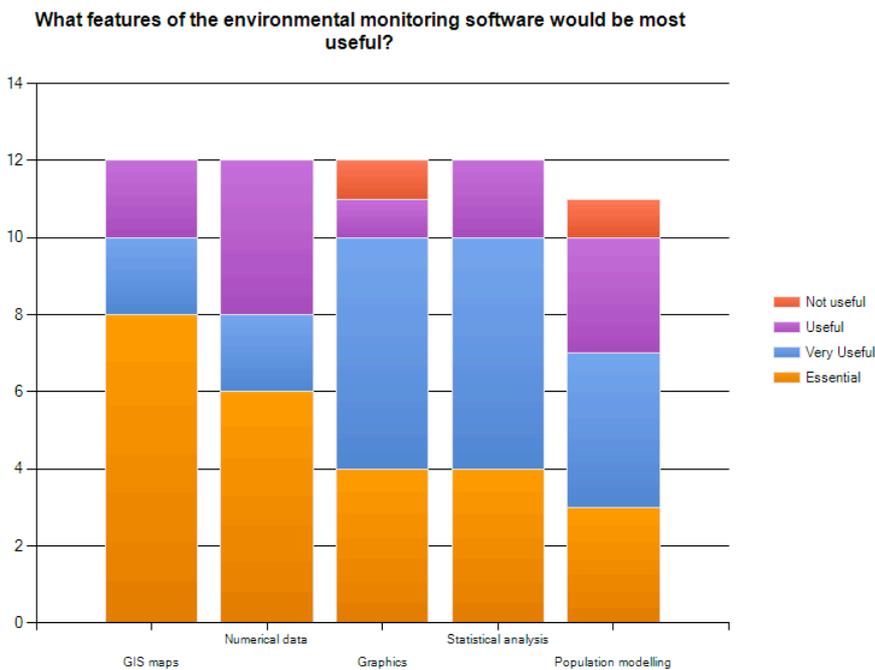
Current software use:

Six respondents stated that they already use software to store and analyse information and five of these stated that this was developed in-house, however

these are limited to Excel based databases (Figure 17). Nine respondents stated that they were not using software.

Figure17: Current software use amongst growers
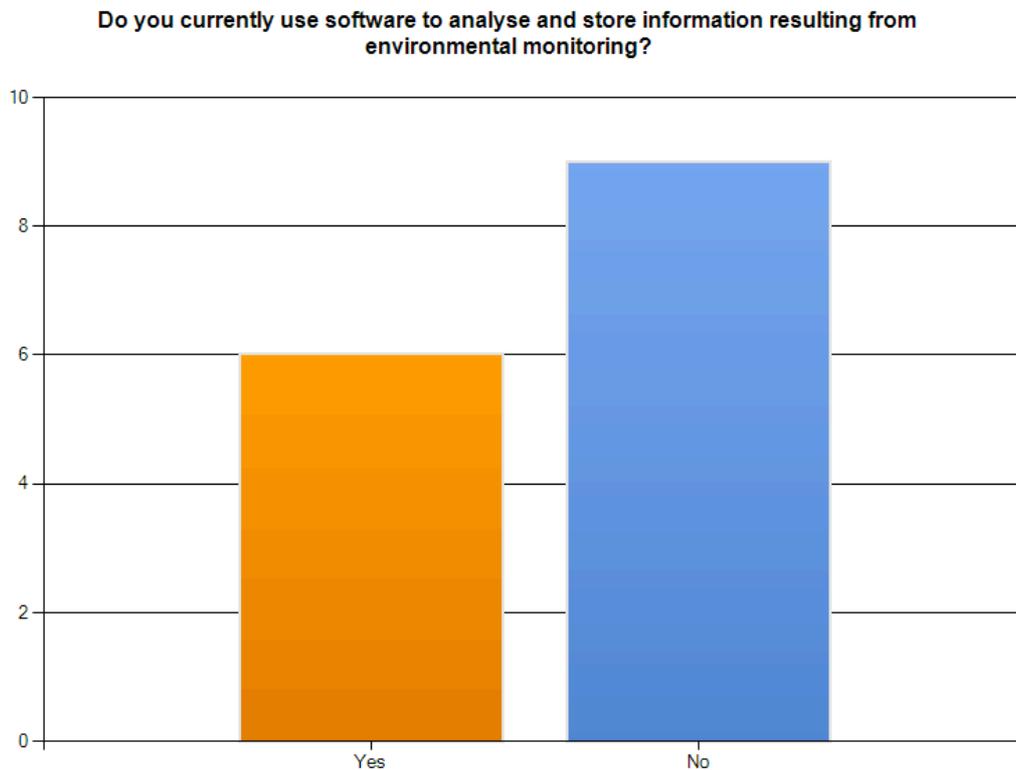
Training was required to use the software currently used for environmental monitoring and this was given to the in-house sustainability teams. In some cases it was given to the IT department and only in one case were the field team trained in how to use the software.

Discussion

This research has identified key themes and problem areas relating to current environmental monitoring practices and software usage.

Monitoring:

The majority of oil palm companies interviewed or surveyed had HCV areas present in their concessions; however, the number of HCV designated areas undergoing regular monitoring varied greatly between growers as shown in figure 3. Interview responses indicated that large companies have both the expertise and financial capacity to carry out monitoring, but both large and small companies lack the technical knowledge to implement this. In general in-house sustainability teams carry out environmental monitoring and analysis, however the number of personnel with HCV specific training varies greatly between oil palm grower companies.

The budgets allocated to environmental monitoring also vary greatly between companies with the mean percentage of annual revenue being 7.3%. Therefore the cost of the environmental monitoring training and the software must cater for a range of financial resources, but ultimately keep costs low. Environmental monitoring teams range from small teams of less than three people to larger sustainability teams with over thirteen members of staff, the most common category being between 3-5 members of staff. This may depend on the size of the company and the concessions undergoing monitoring. The software will have to be flexible and dynamic to accommodate this variation in capacity.

Results from the semi-structured interviews were generally in line with those of the oil palm growers' survey with regard to current monitoring practices. Many interviewees stated that environmental monitoring within plantations was limited, however the results of the survey indicated that although monitoring was occurring infrequently or ad hoc, a range of biotic and abiotic factors were being monitored. The monitoring protocol should stipulate a specific monitoring methodology with corresponding areas for data input within the software.

The HCV areas within concessions will vary greatly from tropical forest to peat land, therefore the monitoring protocol will have to be dynamic and adaptable to cater to these different ecosystems and the software itself will have to be flexible and inclusive in order to be applied in different regions.

Software use:

Figure 17 shows that only 25% of the Indonesian and Malaysian growers who carried out the survey currently use databases and software. If software is in use, it has often been developed in house using excel, carries out only basic data analysis, and produces simple graphics or numerical data There are a number of open resource environmental monitoring software programmes available online, which are able to conduct sophisticated statistical analysis and produce various graphical and numerical outputs as well as GIS maps. However, the research indicates that these programmes are not in common use by environmental monitoring and sustainability teams in the oil palm sector. These results highlight the need for HCV specific software and training. It also emphasises the

importance successful of marketing to raise awareness of the availability of this software.

The software will need to use a modular approach. This will enable the most basic package of software modules to be delivered first which will complement the basic monitoring protocol. More complex add-ons, such as statistical analysis, can then be added as training is delivered and capacity increases within the organisation. This will also enable smaller companies with limited financial and technical resources to make the use of the basic modules, whilst larger companies with sophisticated monitoring protocols can add on the more complex software modules.

The software must cater and be accessible to teams with varying levels of education. The software structure and design must be clear and user friendly. This was indicated by 'Ease of use' being rated as one of the most important elements of the software. This will enable field/patrol staff with limited education to input the data easily whist sustainability teams, with higher education, carry out more sophisticated analysis. The software must also use simple terminology and the English must be kept at as basic a level as possible. If possible training materials as well as the software itself should also be made available in Indonesian. Ensuring the software is clear and simple to understand will encourage uptake and use. Employing a team of trainers to provide monitoring training and technical support after the protocol and software has been developed would build capacity, increase uptake and facilitate troubleshooting.

Internal communication and management buy-in:
The software will be a fundamental component of the monitoring protocol but, if delivered correctly, could also be used to facilitate improved communication between different departments within palm oil companies, increasing understanding and facilitating management buy-in. The research indicated that environmental monitoring results are delivered in a variety of forms to senior management with 68.4% of respondents delivering results in report form. Therefore software outputs should be versatile and adaptable to each of these forms. Training should also reflect a company's preferred method of reporting and communication. Outputs must be easy to understand and prescriptive so that management teams, with little knowledge of environmental and biodiversity monitoring, have a clearer understanding of the changes occurring in HCV areas and how these are affected by management practices.

The semi-structured interviews highlighted the need for monitoring outputs to feed into companies' key performance indicators to incentivise plantation managers to invest in HCV monitoring rather than ignore it. Environmental management can have a dramatic impact on ecosystem resilience, the health of a plantation and palm productivity. Software outputs and training should illustrate these benefits to management and encourage proactive environmental management. Creating incentives for management to invest in HCV monitoring training and software is essential. It is important that management understand how the monitoring and reporting process feeds into adaptive management

practices and their RSPO commitments as well as benefiting the health of the plantation as a whole. Emphasis of the money saving potential of operational and environmental monitoring in the plantations themselves may also encourage management buy in.

Although 'Cost' was rated as the least important aspect with regard to the software (figure 15), semi structure interview responses indicated otherwise. In fact survey results indicated 35.3% of survey respondents would prefer free software with no support (figure 13). According to these results, the software should be made free and available to download online. This is in-line with competing environmental monitoring software already available and would enable those who do not require training to also use it. No company should be excluded from benefiting from the software, however the survey indicated that there is an acceptance from the growers who took part, that training and IT support would be paid for via a one-off fee, annual subscription or site licence.

The software could potentially be distributed from the Palm Oil Resource Centre, a website being developed this year by ZSL. The website will provide information regarding sustainability practices along the palm oil supply chain and could also act as a forum for discussions and questions about the protocol and software. Companies who have selected regular support and phased training could also be given the possibility of uploading data for remote support from specialists. The site should also act as a platform for sharing growers' case studies and success stories. This positive PR could offer a much needed incentive for growers to adopt the protocol.

The software must be marketed carefully to ensure management buy in. Demonstrations should be held at RT10 as well as at industry trade fairs. Marketing should also include those growers who aren't members of the RSPO as well as those that are. It is interesting to note that two of the grower companies that agreed to be interviewed and showed keen interest in the protocol and software were not members of the RSPO. Non-RSPO members stated that certification was necessary for export but not for the home markets. Smaller companies catering to Indonesian markets may not feel the need to be RSPO certified but it is encouraging that some companies are interested in environmental best practice nonetheless. With the development of the Indonesian Sustainable Palm Oil standard (ISPO), more Indonesian growers will have to conform to sustainable practices. It is important that growers that are not members of the RSPO make use of the protocol and software, however initially ZSL will work with RSPO members as these companies have made a transparent and clear commitment to improving practices and submit time bound plans.

As well as collecting quantitative information about current monitoring and software usage, it was important to also address and understand human behaviour. The semi-structured interviews attempted to draw out and understand companies/management behaviours (what people do), attitudes (feelings towards environmental monitoring) and perceptions (how they feel about the product). This would enable ZSL to better understand how the

monitoring protocol and software should be delivered. In general there was a positive response to the protocol and software; growers showed keen interest and were willing to participate and provide input. However self-reported behaviour must always be treated with caution and although much of the feedback received regarding the protocol and software was positive there may be a substantial disparity between reported actions and actual actions. Whether companies adopt the protocol and make use of the software will depend heavily on how it is marketed and the perceived cost benefit ratio it delivers.

Research limitations:

The results collected from the questionnaire are only a representative sample of growers in the oil palm industry and heavily biased towards Indo-Malay region, however they do give some indication of the current use of monitoring protocols and software as well as grower attitudes and reservations. The participants targeted by the research were predominantly RSPO members and therefore already have an interest in improving sustainability and environmental practices within their plantations. Furthermore the respondents were self-selected and volunteered information. However, the protocol and software being developed by ZSL is designed to assist companies pursuing sustainable practices. The companies that responded to the questionnaire and agreed to meeting showed an enthusiasm and interest in improving practices and it could therefore be argued that they are representative of ZSLs target audience.

The information collected from the semi-structured interviews would have benefited from a greater number of participants, but time and travel restrictions prevented this. With hindsight it would have also been beneficial to conduct interviews with plantation managers (those in charge of financing environmental monitoring), field teams and IT departments. Their participation would have increased our knowledge and broadened our perspective on current technical capacity. Respondents were also often unwilling to release certain information such as the details of monitoring protocols and financial data. This is attributed to company privacy policies and the need to maintain a competitive edge.

The market research report provides a starting point for the monitoring protocol and software. The field trials conducted with Wilmar and SIPEF will highlight any further potential problem areas. Many respondents agreed to take part in the next stage of the consultation process and provide feedback and input to the protocol and software once development has begun.

Conclusion

The research conducted by ZSL indicates that there is a need for user-friendly, comprehensive environmental monitoring software for data storage, analysis and output in the oil palm sector. As the RSPO increases the demands on its members to manage, monitor and report on HCV areas, growers will need the guidance and resources to carry this out. The software must be simple to use,

cost effective and feed into management practices. It must produce easy to understand outputs on the status of HCV areas.

To successfully deliver the monitoring protocol and software so as to ensure uptake and usage amongst growers, ZSL must:

- Provide a modular software package, which offers a basic database and analysis tool and subsequent add-ons for more sophisticated and complex data entry and analysis.
- Provide a software programme that produces clear, informative outputs for senior management including GIS maps, graphics and numerical data as well as prescriptive HCV management recommendations
- Provide monitoring and software training to field and sustainability teams as well as training in interpreting outputs for management
- Training must be phased, allowing companies to progressively build capacity and move from basic monitoring to more sophisticated monitoring and analysis.
- Limit the costs of monitoring training and software support
- Engage in a marketing strategy that targets Malaysian and Indonesian growers to encourage uptake
- Successfully communicate the benefits of environmental monitoring and reporting to companies in relation to costs.

In order to increase the capacity of the plantation managers, sustainability teams and patrol staff, training modules will be developed for the monitoring protocol and software database. These modules will be field trialed at our two field sites and sent out for consultation with stakeholders with the results and 'lessons learned' used to refine the protocol, training modules and software before it is made available to other companies.

References

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- EDAS2 (http://www.edas2.com/)
- Estimates (http://viceroy.eeb.uconn.edu/EstimateS)
- Geotech (http://www.geotech.com/firstvisit.htm).
- RSPO Secretariat Sdn Bd "Growth Interpretation narrative" 2011 RSPO
- RSPO Principles and Criteria for Sustainable Palm Oil Production, 2007

Appendices

Companies Interviewed or participated in the survey (some companies chose not to reveal their names)

- PT Socfin Indonesia (RSPO member)
- PT. KLK Agriservindo
- Agrocaribe (RSPO member)
- Tradewinds Plantation Berhad (RSPO member)
- Golden Agri (RSPO member)
- Olam Gabon (RSPO member)
- Bumitama Gunajaya Agro (RSPO member)
- SPZ Enterprise PTY LTD (RSPO member)
- PT Arara Abadi
- PT Agro Harapan Lestarti
- NBPOL (RSPO member)
- PT Krosna Duta Agro Indo
- Golden Veroleum Liberia (RSPO member)
- PT Smart Tbc (RSPO member)
- PT Bisma Dharma Kencana
- Sime Darby Plantation (RSPO member)
- Sipef (RSPO member)
- Wilmar (RSPO member)
- PT Astra Agro Lestari Tbk
- WWF (RSPO member)
- Wetlands International (RSPO member)
- Daemeter
- RSPO
- Copenhagen Zoo