International Union of Forest Research Organizations

Communicating Forest Science: A Daily Task

Proceedings of the International Meeting
"Communicating through the media - why and how"
of the IUFRO Task Force Communicating Forest Science
on 22-24 October 2006, Freiburg, Germany

Edited by Daniela Kleinschmit, Max Krott and Alejandra Real

IUFRO Secretariat, Vienna
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Introduction

"Communicating Forest Science: A Daily Task"

Forest communication experts from 14 countries met in Freiburg, Germany, 2006 to discuss the most suitable instruments for communicating forest science and give recommendations for specific communication activities of IUFRO. Positive examples from around the world show that forest science has a potential to become part of the communication between stakeholders, the media and the public. However, success means that communication must become a daily task for forest science institutions and IUFRO.

Forest scientists are a valuable source of information for stakeholders and the media. However, communication between scientists and the other two is often insufficient. In policy matters, for example, stakeholders have a high demand for expertise, but scientists offer mainly natural science results. They need to learn how to find and formulate scientific answers to the questions really asked. Although scientists may learn to communicate better, there is also an increasing demand for "knowledge brokers".

In media relations, forest scientists must learn how to link their findings better to the problems of society in order to attract attention. The main challenge for IUFRO here is to integrate forest science into the discourse about global problems. It is important to tell the story of global forestry in a simple yet thrilling and relevant way, so the media and stakeholders will listen. Training forest scientists by journalists can be a very effective and efficient strategy to make forest science more visible in the media.

Of course, forest scientists are willing to communicate with stakeholders and citizens, but this will often need a substantial amount of time and financial resources. However, investments will contribute considerably to making forest science better known.

In this issue we have gathered presentations given by our members in the Task Force Meeting in Freiburg, 2006. Through their exciting contributions we are able to gain knowledge on how a more effective communication can be achieved and how is it perceived in the forest science sector.

Obstacles or opportunity? Creating communicators from scientists.

Taylor Bildstein[1]

Notes from a talk given to the IUFRO Communicating Forest Science Task Force
24 October 2006
Freiburg, Germany

What do you need for successful forest science communication?

1. The will to do it (the money as well)

2. Proper training

    - Resourcing: human hours/coaching

3. Invest your time in those with a natural aptitude

4. Share your success stories with other scientists and inspire them.

Choose the right media for training

- *Time Magazine* for example: the science story must compete with global politics, war in Iraq, nuclear proliferation in North Korea, celebrity gossip, financial markets etc etc. It would have to be a really big story to get in.

- But it's not so difficult to get stories in the local and specialist media, ie

    - ***Science media***

    - ***Rural and landscape media***

    - Browse your media databases for ideas

    - Local newspapers

    - Local TV

        - … if it affects that community then it's news.

Specialist media
are an excellent training ground for scientists because:

- They often don't have the same political focus as the news

- They have more time and space for forestry stories

- Scientists can feel safer that they won't be ambushed with politically-motivated questions

- It's an opportunity just to get used to being in a studio and doing an interview

    - By repeating the experience, the scientist builds confidence being in the studio and being interviewed

        - They can then progress to tougher interview situations if needed

[1] CRC Australia, www.crcforestry.com.au

We're asking scientists to step outside of their comfort zones

- So it is our obligation to assist them.
- Personal coaching:
    - Start thinking about how the media works
    - What is a grab?
    - How does the news work?
    - How do different media operate differently?
    - Sit in on a press conference
        - How does it work?
        - What's the difference between what's said at the press conference, how much of it is reported and how it is reported?
    - What other types of coverage does our forest organisation receive?

Preparation

- What is the one key message you want to convey?
- Practise with a journalist, use full gear (ie headset and microphone for radio)

Which medium?

- Radio is a useful first medium
    - Think about who is your audience and what are they doing while they are listening to the radio?
    - The audience is not giving the radio story their full attention: this takes off some of the perceived pressure.
    - The editor can cut any sections that don't work, so less pressure to get it perfect.

Review

- Did the scientist convey the key message?
- (Especially for international scientists): review pronunciation and choice of words.
    - Could synonyms be chosen instead that are easier to pronounce / for the audience to understand?
- Were the answers too long/not succinct enough?
- Practise again.

The audience

Imagine you're at a barbecue and you were just introduced to someone. You know nothing about them and they ask you about your science. When the scientist explains her research, this is the level that she's talking to. That is:

- Probably year 10 science education
- Possesses an average level of interest in the science
- How else could the scientist draw their attention?
    - For example, how does the science relate to other topics such as its affect on the economy, environment, society etc

Example: international student studying Masters in Science

- English is his second language
- On-going coaching
- Just be there (moral support)
    - Going together to the studio
    - Talk about the experience afterwards
    - After some time has passed, review how to do things differently next time

Example: everyone wants to know about the scientist's research

- Socio-economic impacts of plantation forestry
- Preparation of background information for journalists
- Case of the journalist who came early and sat through the presentation. By the time she had the opportunity to ask questions, she had acquired some significant background knowledge. It made for better reporting.

Relationships

- With journalists
    - They need to know that you'll provide them with good stories and good talent
- With scientists
    - They need to know that you won't throw them in the deep end, that if you ask them to go outside of their comfort zone that they will receive the assistance and support they need to do well.

Seeing Eye to Eye in Communication Needs?

Gerben Janse
European Forest Institute

Although scientists and policy-makers may sometimes have a different opinion on what comprises good communication between science and policy, their overall ideas and needs are very similar as a recent study carried out at EFI proves. The most surprising finding may be that while policy-makers seek information on forest policy analysis first and forest resources second, scientists rank information on forest ecology and management first and forest products and socio-economics second.

To gain insight into the communication and flow of information from forest research to policy-makers (in this context, government and forest administration); two surveys were carried out within the EFI member organizations and a selected group of policy-makers. These addressed the ways in which scientific information is received and acquired by policy-makers; which types of information are provided to and needed by policy-makers; which channels are used to transfer that information; and the possible impact of that information on decision-making processes.

Assessing the needs of the others

Scientists state that policy-makers from their own country form the group that most frequently asks them for scientific information. On a 0 (never) to 4 (weekly or more) scale scientists rank the frequency with which policy-makers ask them to provide information at 2.89 (almost monthly). Policy-makers rank the frequency with which they ask scientists to provide information at 2.74.
Regarding topics of information there appeared to be a gap between what scientists say policy-makers find important and what policy-makers themselves ascribe most importance to. Policy-makers rank information on forest policy analysis first and forest resources second, whereas scientists rank information on forest ecology and management first and forest products and socio-economics second.

Preferred channels

Another small gap appeared to be the favored channel of communication to acquire (policy-makers) or transmit (scientists) scientific information. Policy-makers rank email/telephone contact first, participation of scientists in advisory committees second, and face-to-face meetings with scientists third. Scientists rank participation in (policy) advisory meetings first, giving presentations at conferences (where policy-makers are present) second, and email/telephone contact third.
When asked which of two categories of communication channels was more important, personal contact or publications, 79% of scientists and 82% of policy-makers rated personal contact more important than publications.
Concerning information types, policy-makers stated that the knowledge present in their own organization is the most important type of information for policy-makers
Experience and intuition (their own and that of their colleagues) ranks second, together with scientific information.
Policy-makers consider colleagues from within the own organization as their most important source of information, followed by policy-makers from international bodies. Policy-makers from other departments/ministries within their own countries and scientists are ranked third by policy-makers.
Policy-makers were also asked to identify what makes it difficult for them to find the information they are looking for. The three biggest problems appeared to be: excess of available information making it difficult to find what they were exactly looking for; complexity of websites; and restricted access to online journals and databases.
When asked if they believed they had influenced the decision-making process by providing information to policy-makers, 97% of policy-makers said they believed they had.

Good will is not enough

Policy-makers and scientists see eye to eye when it comes to the frequency of the communication as well as the generally preferred channels. The only clear difference in opinion concerns the topic of information. Policy-makers find information on forest policy and forest resources most important,

whereas scientists believe policy-makers find information on forest ecology and management and forest products and socio-economics most important.

Another result of this study shows that policy-makers first and foremost turn to their colleagues when looking for information and that the knowledge present in their own organization, and their own (and that of their colleagues) experience and intuition weighs heavier than scientific information.

Policy-makers main problem in acquiring the scientific information they need lies in the actual search for information: the excess of information already available, websites that are difficult to navigate through, and the limited access to online journals and databases.

Upon asking policy-makers and scientists for recommendations on how to improve communication in the science-policy interface both groups actually share the same line of thought. Both groups feel that scientific information should be presented in shorter and easier to comprehend formats. Both groups also stress that scientists should be involved more in policy advisory meetings and that networking (i.e. personal contact) between scientists and policy-makers should be increased.

To conclude, although scientists and policy-makers may have a different opinion on some aspects of what comprises good communication between science and policy, their overall idea is more or less the same. In addition, they both address the same issues when asked how they would want to improve communication in the science-policy interface. As the spirit is already present, the only thing missing is stronger and more continuous action.

Ideas for improved communication in the science-policy interface

Policy-makers
- Increase scientists' attendance in policy advisory bodies and increase the frequency of direct contact/networking with scientists, e.g. through more science-policy seminars.
- The dissemination of available scientific information and communication on ongoing research activities should be improved.
- Present the scientific information in attractive way and understandable language.
- Policy-makers' organizations should more clearly formulate their information needs.
- Strengthen collaboration with scientists in the stage of development of strategic research agendas.

Scientists
- Produce short and readable information for policy-makers, i.e. tailored publication for policy-makers.
- Initiate contact with policy-makers when important research results are produced.
- Increase scientists' participation in discussion groups with policy-makers.
- Teach scientific staff how important communication with policy-makers is, and how it should be done.
- Set up and effectively use communication channels.
- Supply quality outputs for policy-makers in reasonable time and costs.

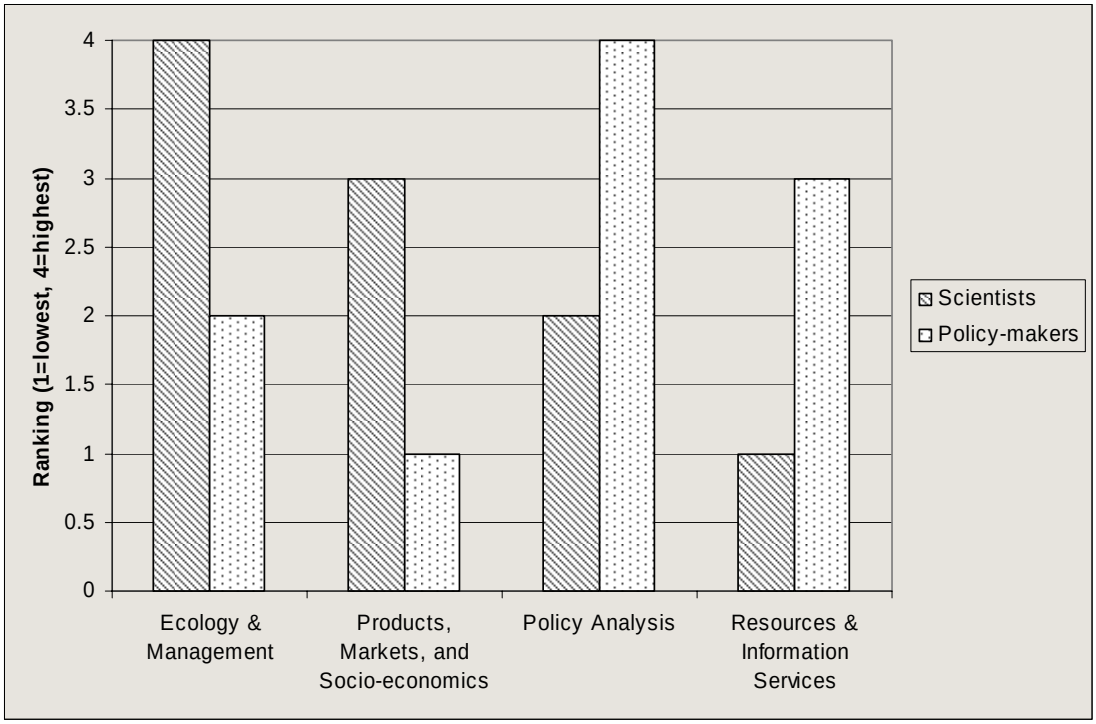

Figure 1: Scientists estimate of which topics in forest science policy-makers find most important, and policy-makers own evaluation (ranked).

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Encouraging Communication and Implementation: Lessons Learned from the Case of the Convention on Biological Diversity's Forestry Web Portal

Ryo Kohsaka
* The views expressed in this paper are personal and do not necessarily reflect that of the institution to which the author is affiliated.

I Introduction

Under the Convention on Biological Diversity (CBD), the Parties and governments have committed themselves to achieve a significant reduction of the current rate of biodiversity loss by 2010[2] (the "2010 target'). As the Convention enters its implementation phase, involvement of different stakeholders becomes critical. In doing so, effective communication between scientists and policy makers is regarded as one of the key needs (Davey and Keenan, 2005). Furthermore, review of such needs comes at a critical stage for the programme of work (PoW) on forest biological diversity, as the in-depth review is scheduled for the ninth meeting of the Conference of the Parties to the CBD (COP 9) in 2008. The in-depth review involves collecting information on the progress made on the implementation of the PoW, barriers to the implementation of the PoW, and priorities for capacity-building to address these barriers[3]. Given these requirements, the experiences of forest scientists and policy makers are of high importance to the Convention.

Why is the lack communication between scientists and policy makers an issue? A Task Force on the topic of communication was established because forest scientists generally lacked knowledge of the communication behaviour, with a few exceptions of "star scientists." The purposes the Task Force were to gain influence on the political process and to better legitimatize the scientific activities, in which communication plays a critical role. In the first meeting of the Task Force on forest science and communication, two underpinning obstacles were identified: (i) institutional weakness and (ii) differences in perceptions and behaviors of scientists and policy makers. In addition, a case was made during the Task Force meeting that perceptions and behavior differed largely between the scientists and policy makers when making decisions or collecting information (Janse, 2006). Previously, it was generally believed, that science had a significant role in both informing and shaping policies. However, establishing an effective science-policy interface remains a challenge for most countries. This challenge is particularly true for developing countries where resources are limited (Reed, 2002). In short, communication is increasingly regarded as major challenge for the forest science community.

In addressing these challenges, an information exchange system called the "Clearing-house Mechanism" (CHM) was established in order to ensure that all Parties and governments have access to the information and technologies they need for their work on biodiversity[4]. By doing so, the CHM of the CBD aims to promote the effective implementation of the objectives and goals of the Convention. In the current system, the CBD website serves as the main gateway for information exchange. A number of regional workshops were organized to assist Parties and governments in developing and maintaining platforms (particularly in relation to the reporting and dissemination of information in websites). The CHM is not without criticisms however. In her article, Reed (2002) points out that the meaning of CHM is unclear and the concept is rather elusive [5]. In addition the majority of the CHM is run in a top-down style and customary barriers, where information sharing is not a strong tradition, are present (ibid.). As a consequence, dissemination of information still relies on face-to-face, telephone calls and posting paper documents. Based on the third national reports of the Parties to the CBD, lack of awareness, lack of resources, problematic institutional arrangement (or coordination amongst different institutions), and technical issues were both common challenges in implementing the PoW on forest biological diversity, in particular for the developing countries. As positive trends, a number of

[2] Decision VI/26: Strategic Plan 2002
http://www.biodiv.org/decisions/default.aspx?m=COP-06&id=7200&lg=0
[3] For details and exact wordings: Annex III to Decision VIII/15: Guidelines for the review of the programmes of work of the convention
http://www.biodiv.org/decisions/default.aspx?m=COP-08&id=11029&lg=0
[4] URL on CHM of the CBD: http://www.biodiv.org/chm/default.aspx
[5] To quote Reed (2002; 117), it was pointed out that "there are so many different conceptions of the functions of the Clearing-house Mechanism probably represents the greatest obstacles to its implementation."

wide-scale information sharing projects are on-going at both national and international scales, in such fields as seeds and genetic resources or ecosystem related information.

It is beyond the scope of this paper to answer these CHM issues in a comprehensive way. The question raised here is limited to the communication challenges in the area of the PoW on forest biological diversity and the actors concerned are limited to scientists and policy makers. The questions are two-fold;

- What progress has been made in terms of communications relevant to the PoW on forest biological diversity and what are the barriers and lessons learned?
- How can the CHM accommodate the different communication style between scientists and policy makers in the future (assuming that the differences exist)?

The questions are addressed in an explorative manner by listing elements in bullet points. The discussions are based on ideas and experiences from the two relevant meetings; the Task Force on forest science and communication[6] and the meeting of the informal advisory committee communication, education and public awareness[7]. The latter was not limited to the issues in the PoW on forest biological diversity but had more general purpose to brainstorm ways to promote communication, education, publication and awareness raising activities. Members of the meeting discussed implementing short lists of priority activities agreed to by COP8 (such as International Year of Biodiversity, tool kits and workshops, developing key messages and media relations strategies).

II Current Development of CHM

There were a number of decisions relevant to outreach and communication made at the eighth meeting of Conference of the Parties to the CBD, held in Curitiba, Brazil from the 20th to 31st of March 2006. Amongst others, the following decisions were directly relevant to the operation of the CHM in the forest PoW;

- Incorporate the CBD's forest-related information more comprehensively into the web portal of the CPF[8]
- Suspend operation of CBD's forest web portal[9]: and
- Discontinue maintenance and use of the roster of experts for scientific meetings[10].

As a result of the first two decisions, the web portal has been streamlined into the CPF website and the experts for the scientific meetings are selected by nomination instead of the roster system. Further background information is given in the texts of the decisions. Despite the efforts by the Secretariat, the use of the forest portal was not utilized to its full extent. The actual web portal was composed of discussion forums, relevant documents, update news and the expert lists. The access was open to all and open-ended in timeframe (i.e., no deadlines were set). For the discussion here, the focus is limited to the experiences from the online discussion forum.

Originally, the roster of experts was designed to be utilized for selection of experts by the Secretariat as well as the general public to identify the experts in the field. Thus, the list of roster experts is publicly open under the CHM of the CBD[11]. The experts are categorized with different criteria and items (on CBD areas, disciplines, nominating governments, type of nominations, and abilities in the UN official languages). The viewers were asked to request the contact information from the Secretariat as full contact information was not disclosed due to security reason.

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[6] First Meeting of the IUFRO Task Force "Communicating Forest Science" held in Freiburg. i.Br (22-24 Oct 2006)

[7] Meeting of the Informal Advisory Committee Communication, Education Public Awareness held in Montreal, Canada (11-12 Dec. 2006)

[8] VIII/19 A paragraph 6: *Invites* the Food and Agriculture Organization of the United Nations to incorporate the forest-related information of the Convention on Biological Diversity more comprehensively into the web portal of the Collaborative Partnership on Forests
http://www.biodiv.org/decisions/default.aspx?m=COP-08&id=11033&lg=0

[9] VIII/19A para. 4(d): Suspend the operation of the forest web portal of the Convention on Biological Diversity because of its low rate of use, and re-direct Parties, via a hyperlink to the Collaborative Partnership on Forests' Joint Information Framework web site, hosted by the Food and Agriculture Organization of the United Nations;

[10] VIII/10 paragraph 17: *Requests* Parties to give priority to the nomination of appropriate scientific and technical experts for participation in ad hoc technical expert groups and other assessment processes, and decides to discontinue the maintenance and use of the roster of experts
http://www.biodiv.org/decisions/default.aspx?m=COP-08&id=11024&lg=0

[11] http://www.biodiv.org/roster/default.asp

What were the barriers and lessons learned from the use of the portal? The following are the elements identified;

- Lack of incentives for the participating experts
- Difficulty in determining topics/duration for discussions

One of the barriers for the portal was the lack of incentives for the public or experts to participate. There was a growing feeling that a face-to-face meeting was necessary for launching a successful online forum discussion. Other possible ideas would be to acknowledge and give credit to the contribution of experts in printed publications, such as newsletters or reports. Such measures would motivate participants, in particular from scientific communities.

The choice of the topics and duration of discussion was another difficulty. As a general principle, the public is likely to submit their views more if the duration is limited.
The topics for discussion where presented in question format and covered a variety of issues relevant to the CBD and biodiversity issues. The topics for discussion included issues relating to the comprehensiveness, representativeness and adequacy of protected areas, measures taken to encourage stakeholder involvement, measure taken to complement protected area networks and the effeteness of protected areas in conserving forest biological diversity. In total five questions where posted for discussion, with each question having several related sub-questions.

These topics chosen for the online forum based on needs arising from effective implementation of the PoW. Some issues surrounding PoW and sustainable forest management were contentious (such as livelihood and culture, sovereignty and shared responsibilities), and the topic required a high level of expertise. Dividing the issues into different approaches (social, economic or environmental) or disciplines can be one option but this was not possible due to the limited number of participants.

The elimination of the CBD web portal and the integration of the content into the CPF website will streamline certain duplications of the different international processes. The initial steps of this process will include the streamlining of documents, lists of experts and scheduled meeting. As further steps, common grounds for reporting to different international processes are discussed in the CPF forum, spearheaded by the FAO and UNFF. In addition, the overall structure and design of the CBD websites themselves are renewed.

The second change resulted from the decision to discontinue the use of the roster of experts as a means for identifying experts for advisory meetings. The following limitations to the roster system have been identified:

- information was not up-to-date
- full contact information was not listed
- the selection process of the scientists were based on political appointment rather than scientific categories or criteria

The roster system had three technological and procedural limitations. The first was that the nominations were not done on a regular basis but tended to come in waves and remained unchanged for a long period. This is understandable given the registering burden and limited resources of the governments. The other limitation was security. The full contacts of the experts were not listed but the enquiring person was asked to contact the Secretariat for details. This was designed to protect the privacy and security of the listed experts. The Secretariat did not have information as to the preferences of the experts involved as to whether to disclose their information or not. Therefore for safety and privacy reasons the Secretariat decided not to disclose contact information in the database. The third point was regarding the discipline and field of the expertise. As the nominating body was not necessarily the scientific institution, it was pointed out that nominated experts did not reflect the described categories in the disciplines and areas. The roster of experts in most thematic areas is currently being transformed into links to other organizations, where updated and focused lists of experts are available.

Faced with these limitations and constructive suggestions from Parties, the Conference of the Parties have decided to discontinue the “roster style” and “requested Parties to give priority to the nomination of appropriate scientific and technical experts for participation in ad hoc technical expert groups and other assessment processes.” The decision calls for attention to nominate appropriate scientific and

technical experts. The next ad hoc technical expert group (AHTEG) meeting for the in-depth review of the forest PoW is planned for May-June 2007, and nomination of experts is being conducted. There are existing members but the Secretariat has sent notification to nominate experts in order to balance the bio-geographical representations of AHTEG. The goal is to increase the representation of the lesser-represented regions[12].

III Conclusions

There are two lessons from the experience of the forest web portal:

- Providing an enabling environment for initiating dialogue is critical
- Management of information needs to be decentralized

The provision of an enabling environment is as important as the infrastructure of the online discussion. As indicated, by the expressed need for the face-to-face meeting, there are demands for certain promoters or facilitating designs to initiate online discussions. The other lesson is regarding the management of the information. Regarding the roster system, the listed experts themselves may well be best positioned to categorize and update their information relating to expertise or areas as part of the issue was the security concerns arising from disclosing all relevant contact information. This issue can be overcome by giving the experts choices as to what extent they would want to disclose their information.

The lessons learned from the case of the forestry web portal are relevant to all areas in which discussion and communication between scientists, policy makers and the public more broadly, are required for the successful implementation of projects. By learning from the issues surrounding the Convention on Biological Diversity's Forestry Web Portal and incorporating these lessons into future communication endeavors, the efficiency and effectiveness with which they are carried out could be increased.

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[12] Notification 2006-067(Ref SCBD/STTM/MG/VA/55131): Increased bio-geographical representation for Ad Hoc Technical Expert Group on Review of Implementation of the Programme of Work on Forest Biological Diversity

[13] First Meeting of the IUFRO Task Force "Communicating Forest Science" held in Freiburg. i.Br (22-24 Oct 2006)

How do scientists see communication about forest ecology to non-scientists: example from Slovakia

Katarina Sladekova[14]

Introduction

In the Slovak Republic, scientists -forest ecologists included- are increasingly challenged to communicate with the public at large -primarily young people-, policy-makers and the media. Scientists have different views on public engagement in science. With the aim to communicate forest ecology more effectively, scientists along with communication specialists, as well as donors can use the recorded views to develop communication strategies, programs, proposals for communications, media and public engagement projects.

The presented findings on communicating science by the scientists to non-experts were acquired during a survey conducted at the Institute of Forest Ecology of the Slovak Academy of Sciences (IFE SAS) in October 2006.

Institute of Forest Ecology of the Slovak Academy of Sciences (IFE SAS) at a glance

The Institute is located in Central Slovakia in the town of Zvolen - a centre of forestry research. It is one of the 56 scientific institutes belonging to the Slovak Academy of Sciences. The IFE SAS focusses on basic and theoretical-methodological research on forest ecosystems mainly in the Western Carpathians, some projects have practical outcomes. The research results, as well as the scientific process itself are communicated to the non-specialist public by the Institute's scientists and the workers of the Centre of Scientific Information - Library. Perhaps the best known communicator of nature science in Slovakia, Dr Miroslav Saniga, is one of 33 scientific workers of the Institute.

Aim of the survey

The main aim of the survey was to identify the attitudes, views, factors and their roles in affecting the science communication work to the public outside the scientists' field among the scientists at the Institute of Forest Ecology of the Slovak Academy of Sciences.

Methods

A questionnaire from the "Factors affecting science communication: a survey of scientists and engineers" study (The Royal Society, 2006), commissioned by the Royal Society, Research Councils UK and the Wellcome Trust and conducted in April 2005-February 2006, was used as a pattern for the survey. The report is accessible on http://www.royalsoc.ac.uk

The questionnaire was distributed among 32 respondents - scientific workers at the IFE SAS. A total of 20 copies of the completed questionnaire were returned. The respondents were asked to answer 36 questions. Only few questions were open-ended, others were closed-answer ones, which predefined the range of responses. Key results are summarized below.

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Key results

1. What does public engagement mean to scientists?

Question: *Scientists are being asked to engage more with the non-specialists public. What, if anything, does this mean to you?* (Open-ended question)
The most frequent answers were:

- To inform the public about the research results in an understandable way
- To explain the scientific process
- To highlight the implications and the relevance of science to individuals and the society
- To inform the public how the public funds for research are used.

2. Why is public engagement important to scientists?

When considering their own research, they are:

- Wider social and ethical implications of the research findings for society - 56 percent
- Enjoyment and excitement of doing science - 50 percent
- The scientific findings of the research - 47 percent
- Potential benefit of the work for individuals - 47 percent
  of scientists see as very important (ranked 4 to 5 on a scale 1-5) issues to engage the non-specialist adult public.

3. Why is public engagement important to scientists?

The most important reason **generally** to engage the non-specialist public was:

- To ensure the public was better informed about science and technology - 35 percent reported
- To raise awareness about the subject - 30 percent reported
- To be accountable for the use of public funds - 15 percent of scientists reported.

4. How important is public engagement?

According to the scientists' answers, it is not at all important 5 percent; not very important 30 percent; equally important 30 percent; fairly important 30 percent; and very important 5 percent to find time for engaging with the non-specialists public in relation to the other things the scientists have to do in their working life.

5. Audiences

Question: *How important do you feel it is that you personally, in your current post, directly engage with each of the following groups about your research?* Please rate importance on a scale of 1 to 5, where 1 is not important and 5 is very important.

- General journalists
- Popular science journalists
- Others in the media such as writers, documentary and other programme makers
- Schools and school teachers
- Young people outside school
- Policy makers
- Industry/business community
- The non-specialist public
- Non-governmental organisations (NGOs).

As it follows from the answers, the most important audiences identified by the scientists to directly engage about their research (ranked 4 or 5 on a scale 1-5) were the following:

- Popular science journalists - 89 percent of scientists reported
- Schools and school teachers - 82 percent
- General journalists - 65 percent
- Others in the media such as writers, documentary and other programme makers - 65 percent
- Policy-makers - 53 percent
- NGOs - 53 percent.

5. Audiences

Question: *Which of these groups do you find it easiest to talk with about your research findings?*
Policy-makers; industry/business community; popular science journalists; general journalists; others in the media; press officers in universities; school teachers; young people in schools; young people outside school; the non-specialist public; NGOs; patients/patient groups; none/don't know.
The most cited groups were popular science journalists - 70 percent of scientists reported, followed by general journalists - 30 percent and school teachers - 20 percent.

Question: *Which of those groups do you find it hardest to talk with about your research findings?*
Policy-makers were the most frequent answers - 50 percent of scientists reported.

6. Activity

- 95 percent reported having taken part in at least one science communication or public engagement activity in the past 12 months
- 79 percent participated in an institutional open day
- 63 percent said they had worked with teachers (schools)
- 45 percent had written for the non-specialists public (including for the media, articles and books).

7. Barriers to science communication

- 40 percent of scientists said they would have to engage the non-specialists public in science in their own time.
- The need to spend more time on research was stopping 40 percent of the scientists getting more engaged.
- The need to spend more time on administration was stopping 40 percent too.
- The need to spend more time on getting funding for the research was a barrier for 40 percent of scientists.
- 65 percent said that the time taken away from research was the main drawback for engaging.

8. Incentives for science communication

The top incentives:
- If grants for engagement covered staff time as well as other costs - 88 percent
- If the engagement activities brought money into the department - 78 percent
- If the accreditation criteria were changed to encompass communication with the non-specialist public - 72 percent
  of scientists said that the mentioned incentives would encourage them a great deal or to some extent to undertake more public engagement.

8. Incentives for science communication

- There was strong agreement of 81 percent versus 13 percent disagree that donors of scientific research should help scientists to communicate with the non-specialist public, and
- 47 percent agreed versus 18 disagreed that a help would be needed to develop a science engagement project. Other scientists marked the variant "neither" or "don't know".

9. Training and demand

- 80 percent of scientists surveyed have had no media, communications or public engagement training.
- 45 percent of scientists wished to spend more time undertaking public engagement activity.

Conclusions

One-way communication, scientific findings alongside wider connections of the science

- To inform the public about research results, to explain the scientific process, to highlight the implications and relevance of science to individuals and the society, and to inform the public how public funds for research are used belong to the most frequent scientists' associations of engaging the non-specialist public in science.
- Dialogue and debate were missing in the answers expressed in their own terms.
- In the predefined answers to the question on the most important issues for the scientists to engage the non-specialists about their own research, wider social and ethical implications of the research findings for society, enjoyment and excitement of doing science, the scientific findings of the research and the potential benefit of the scientific work for individuals were identified.
- Regarding the most important reason generally to engage the non-scientific public, the scientists preferred the alternative 'to ensure that the public was better informed about science and technology' - 35 per cent and the alternative 'to raise awareness about their subject' - 30 per cent. Next in priority was 'the accountability for the use of public funds'- 15 per cent.

Summarizing the questionnaire results it can be stated, that scientists see engaging the non-scientific public in science as a one-way communication. The second important result is that not only the scientific results, but also the scientific process itself and wider connections of the science to the individuals and the society are of big significance for scientists to communicate about.

Popular science journalists as friendly media representatives, policy makers hardest to communicate with

Popular science journalists are the most important audience identified by scientists to directly engage about their research. They are followed by schools and school teachers - 82 percent, which coincides with the given high number of scientists of 63 percent having worked with teachers (schools) in the past 12 months. The most - 79 percent of the scientists participated in an institutional open day during the given period. This high number is connected with the regularly organised week of open doors at the IFE SAS. School children are the most numerous visitors there. It is encouraging, that 95 percent of the scientists reported having taken part in at least one science communication or public engagement activity in the past 12 months.

Popular science journalists are friendly media representatives. One respondent said: *"These journalists are in general independent, avoiding stresses exerted by media and policy makers. Their professional erudition makes them well aware of obstacles, possibilities and perspectives in science development."* 70 percent of the scientists find them easiest to talk with about their research findings, followed by general journalists - 30 percent, and school teachers - 20 percent.

The results on the hardest audiences to talk with require quick action to change the things. The policy-makers were identified by 50 percent of the scientists to be the hardest group for the scientists to communicate with. Nevertheless, more than half of scientists - 53 percent marked them as the most important group to be engaged directly with their research. One respondent said: "*To gain their favour is very difficult, especially for a common scientist. The final result, however, can be decisive for spreading of the new knowledge across society. The cooperation with these people requires high literacy, patience and strong internal spirit of specialists capable to force the results of their work in the environment driven by the money carrousel*."

Research led culture in the Slovak Academy of Sciences

As the results of the questionnaire indicate, the barriers to science communication with the non-scientific public have their roots in the current research led culture at the institutes of the Slovak Academy of Sciences, e.g. pressure on the scientists to publish scientific papers and bring funding for research into their institutions or departments. When it comes to finding time to engage with the non-scientific public in relation to the other things the scientists have to do in their working life, 5 percent reported it is not at all important to find time for public engagement, 30 percent said not very important, for 30 percent it is equally important, 30 percent marked the alternative 'it is fairly important' and 5 percent 'very important'. 40 percent of the scientists said they would have to engage the non-scientific public in science during their own time, if they wanted to be (more) involved in the activities on

engagement. The need to spend more time on research was a barrier to engage for 40 percent, the need to spend more time on administration was stopping 40 percent, and the same proportion of the scientists marked their need to spend more time on getting funding for the research as a barrier. 65 percent stated that the time taken away from research is the main drawback for generally engaging with the non-specialist public about science.

88 percent of the scientists said, it would encourage them a great deal or to some extent to undertake more public engagement, if the grants on public engagement covered staff as well as other costs, 78 percent if the engagement activities brought money into the department, and 72 percent if the accreditation criteria were changed to encompass communication with the non-specialist public.

Scientists need help to communicate

According to the survey results, more responsibility is ascribed to the donors of scientific research in that sense, that they should help scientists communicate with the non-specialist public. Almost half of scientists reported that they would need help in developing a science engagement project. A big opportunity emerges for the communication specialists.

The scientists are trained on media, communications or public engagement activities to little extent. 80 percent of the respondents have had no training.

Almost half of the scientists surveyed wished to spend more time undertaking public engagement, only 5 percent less time.

Discussion

Dominance of research in science based institutions hinders scientists to be more engaged in activities with the public. This applies not only to the Slovak Republic (SR). An academic career in the UK is dependent on research publications, as it was highlighted in the “Factors affecting science communication: a survey of scientists and engineers” study (The Royal Society, 2006). In the SR, scientists are burdened by scientometry, often depressed by unsuccessful applying for scientific grants and by excessive administration. One scientist from the Institute of Forest Ecology of the Slovak Academy of Sciences said: “*There is not enough time and money for real science*”.

By performing more public engagement work, scientists can acquire support from many audiences, such as policy and decision-makers, industry/business community, media, young people and public at large. As a result, scientific projects will be easier to obtain.

Both, to communicate with scientists and to communicate with the people outside the scientists’ field are of equal importance. In addition to the national and transnational public engagement efforts, much work can be done through support of public engagement work by the top management of the science based institutions.

An Approach for Delivering Research Results In the Southern United States[15]

Carol Whitlock[16] and H. Michael Rauscher[17]

Introduction

The USDA Forest Service[18] research and development program (R&D) consists of five regional stations, a forest products laboratory, and a tropical forestry institute that, taken together, comprise the largest network of natural resource research organizations in the world. Within this network is the Southern Research Station, which serves a 500-million acre (202-million hectare) area stretching from eastern Texas to northern Virginia, roughly the distance from Helsinki to Rome. Established in 1926, the Southern Station employs approximately 135 paneled[19] research scientists and a support staff of nearly 300 professional, technical, and administrative employees. An annual budget of about $50 million supports these employees in forestry sciences laboratories, experimental forests, and natural resource departments on university campuses. Their disciplines range from siliviculture to hydrology to economics.

Until late in the 20th century, the terms research and publications were synonymous. Like their university colleagues, our scientists were evaluated on the quality and number of their publications. Supporting their efforts were staffs dedicated to technical editing, styling manuscripts and submitting them to journals, and publishing the manuscripts that the scientific journals did not want, either because they were too lengthy or because they had limited scientific value.

For nearly a century, Forest Service scientists were taught that they produced the research findings and that somebody else—usually somebody in the agency's State & Private Forestry program—found ways to deliver those findings. Although individual scientists made individual efforts to deliver their findings beyond what could be found in their research papers, those efforts were ad hoc, not supported by headquarters staffs, and often resulted in career setbacks because of the "publish or perish" ethic that pervaded the reward system for scientific accomplishments. People needing information could order station series publications or reprints of journal articles, all of which were highly credible but with uneven levels of accessibility and readability. As late as 2003, a polling of principle investigators in the South showed that journal articles and conference proceedings were ranked as the two most important science delivery mechanisms.

But what works for individual scientists' careers has begun to work against their ability to attract funding and support for their work. Members and committees within the U.S. Congress have become less inclined to spend dwindling natural resource dollars to fund science for the sake of science. The Office of Management and Budget has questioned our ability to demonstrate the value of our research to the public. And leaders in our own Department of Agriculture have expressed frustration with a science organization that could only raise questions without providing some practical answers to those questions.

Most significantly though, the South was changing from a predominantly agricultural and rural environment in which the forestry community represented and closely communicated with forest land owners. The new South is an environment of rapid urbanization, dramatically changing demographics both in cities and small towns, and the divestment of vast industry-owned forests with unpredictable results. Recent customer surveys have shown that our science, though still highly credible, was becoming less relevant to the needs of the South and that our research products were not keeping up with the needs of potential users.

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[15] Presented at the ForestXchange Conference, Freiburg, Germany on October 27, 2006.

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[18] The Forest Service is an agency within the U.S. Department of Agriculture.

[19] Under the Research Grade Evaluation system used throughout the Forest Service, all research scientists undergo a rigorous peer review of their progress every five years. Based on their findings of creativity, productivity, relevance, and leadership, the panel of peers will recommend that the reviewed scientist be promoted, passed over, or demoted.

Unfortunately, when we looked around for help from our colleagues in the forestry community, we found that the capacity for science delivery had diminished greatly just as demand was growing. We also came to the recognition that our previous strategy of making findings available to a relatively small group of professionals had limited value in a region dominated by a multitude of landowners whose holdings, though small at the individual level, in aggregate comprised the best hope for forest sustainability in the South . These landowners rarely, if ever, received the services of forestry professionals.

Clearly change was needed. The objective of this paper is to describe changes in the science delivery program at the Southern Research Station—a $6 million effort that represents a little more than 10 percent of the Station budget. The paper summarizes the steps being taken to incorporate science delivery work into the fabric of the Southern Research Station, both in the Station's research units and in the Station's Science Delivery Group at Station headquarters, and describes a few of the products and partnerships that are emerging from that effort. The paper concludes with a discussion of how we are engaging with partners, customers, potential customers, and other stakeholders in a systematic effort to make the adoption of research results a regional priority.

Changing the culture

The growing pains we were experiencing in the South were not unique to us—throughout the Forest Service R&D program discussions were held at all levels about improving both the relevance and the delivery of research. Over a six-month period in 2004 scientists, communications professionals, and research administrators convened a series of sessions to identify measures of success in science delivery. The result of those sessions, called A Logic Model for Science Delivery, was twofold. First, was an affirmation that Forest Service R&D has a responsibility to ensure the adoption of its findings, and second was the development of a behavioral model that would improve the likelihood of adoption: (1) engaging users and partners in identification of research needs, priority-setting, and program delivery planning; (2) providing information seekers with understandable, rapid answers synthesized from current and past findings; (3) developing products that meet users needs, are easy to locate and apply, and are supported throughout their life cycle; (4) building user confidence through consistent branding that associates R&D products with the established credibility of the R&D organization

These new exigencies have brought change to the Southern Research Station, where the consumers of our products can be sorted into three major categories. First is the science community, including teachers, students, and researchers in universities, government agencies, and international organizations. Second are the policy makers and influencers, including law makers, regulators, NGOs, industry associations, and the general public. And third are people who use our information to manage land, including forest industry, government agencies, landowners, consultants, conservation organizations, and Indian nations. Of these three categories, we believe that the greatest opportunities for improvement are in the policy arena, where better integration of research is needed, and in the land management arena, where service is uneven.

Growth of science delivery in the research units

In many of our research units, recognition of the importance of science delivery has been translated into a commitment to shift funding away from new studies and toward communicating the results of studies. Some units opted to hire science delivery "experts" while others took the approach of making science delivery a part of the scientific process.

Units working at experimental forests in the Southern Appalachians, the Coastal wetlands, the Mississippi Delta, and the mid-South conduct workshops and short courses on forest management for customers ranging from congressional staffs to professional foresters. Units that are involved in issue-related research, such as fire disturbance and southern pine beetles, have aggressively pursued a science delivery program that puts their research results in the hands of their customers.

Some of our research units provide direct services to customers. One example is in the Southern Appalachian Mountains, where our biologists organize survey teams to monitor habitats and populations on national forests. Another example is two partnerships of our wood products scientists: one with industry to recycle pallets into attractive flooring products and the other for gasifier that provides electricity to a local ranger district office and allows research into the effects of various raw materials on the yield of gases and the system performance.

Other units—especially those focusing on human-resource interactions like the wildland-urban interface unit, the urban forestry unit, and the agroforestry unit—combine direct customer service with

a wide spectrum of integrated products that include Web sites, fact sheets, newsletters, annotated bibliographies, exhibits, and professional workshops.

Revamping the science program

In recent years, our capacity to continue productive research has been threatened by declining budgets, the changing nature of research questions, and shifts in customers and their expectations. Earlier organization structures that had clearly reflected our scientists' capabilities and the uniqueness of the Southern landscape began to lose relevance when applied to the emerging issues of the 21st century. Fire, global change, nonnative plant invasions and other disturbances are replacing a single species or forest type as a research focus, while the impacts of development and land parcelation on sustainability often far exceed the impacts of all forest management options. These research problems require highly integrated research program incorporating insights from multiple disciplines.

Recognizing the necessity of organizational change, we set out to provide continuity of research units in working with partners and serving current customers, while improving our ability to conduct integrated research and broaden our customer base. Our new organization consists of 5 science areas representing the core strengths of our science program and 15 research units, consolidated from 28 to increase administrative efficiency. The shift of science planning and research selection from the numerous research units to a handful of science areas will allow more meaningful engagement with customers on issue identification, enhancing the relevance and consequence of our research results.

Support from headquarters

At headquarters, a revamped Communications Office, renamed the Science Delivery Group, has added capacity in marketing, Web presence, customer service, and design—partly through a modest increase of funding (3 percent) and partly by reengineering publications processes and redirecting the resultant savings. These new investments have strengthened our Web outreach and have allowed us to refocus part of our editorial and design efforts away from publications for scientific audiences and towards products for other user communities.

The mission of the Science Delivery Group is to develop timely, credible, and pertinent science products that contribute to forest sustainability in the South. To be effective, these products must reflect an understanding of emerging issues and crises, the capabilities of our scientists and partners, and the preferred delivery mechanisms of the widening communities of interests that collectively determine the future of southern ecosystems.

The Science Delivery Group has an annual budget of $1.5 million, of which $1 million is in salaries and the remaining half million is in printing, contracting, and other operating expenses. Our staff continues to provide traditional services such as strategic communications advice and planning, media and congressional relations, editing and publishing publications, and direct customer services of all kinds. In addition we have begun work in formal and ad hoc teams to: (1) prepare and publish a quarterly magazine on important natural resource issues in the South; (2) deliver research products via the Internet, and (3) work collaboratively on products, services, and systems that will increase the likelihood that research results are adopted.

New products and services

The Southern Research Station is revamping two important series of publications, General Technical Reports and Resource Bulletins, to make them more useful and easily accessible to a greater range of users. In the case of General Technical Reports, this may involve having draft manuscripts read and critiqued by representatives of user groups, and revising the manuscripts on the basis of the comments received. It may involve improving the esthetics of publications by using more color and more appealing graphics. It may also involve making publications available in multiple formats, including electronic ones, and ensuring that products are supported for multiple platforms and over the course of their useful life. Web-based products are supplementing and at times replacing paper for research reports and conference proceedings. For material that works best in paper format, more effort is being placed on tailoring products to specific customer groups. Color photographs, maps, and graphics are becoming more common for these products. The need for customer testing of products is becoming a generally accepted practice.

Quarterly science magazine

The Station's new quarterly science magazine, *Compass*, is designed to address issues affecting Southeastern forests, showcase pertinent research by Station scientists and collaborators, and make new products available to customers through a catalog listing. The intended audience includes the general public, elected officials, media, educators, land managers, researchers, cooperators, private landowners, and engaged citizens. Each issue consists of one to three feature-length articles, two to five shorter articles and sidebars around a single topic of pressing interest to the intended audience, a profile or interview with a Station scientist, a profile of an experimental forest or important research site, recommended readings related to the feature article, a toolbox to give landowners specific information they can use on their own land, news from around the Station, and the annotated list of new products. The *Compass* is designed to both structure and complement the text, and to lead the reader through the magazine. Photographs serve to illustrate stories and to feature projects not covered in the text. Illustrations are commissioned to convey complex concepts such as the hydrologic cycle.

Publishing processes. The Compass editorial board consists of six professionals in the Science Delivery Group with deep knowledge of the Station's research program and audiences and expertise in editorial oversight, writing, and design. They are augmented by guest editors from the research units for individual issues that require subject matter expertise. Before the stories for an issue are set, the editorial board uses input from Station scientists and other sources to decide what should be covered, the content of the major stories, and who should write them. Authors of Compass articles include editorial board members, Station scientists and other natural resource specialists, and freelance writers. They are expected to follow a set of comprehensive writing guidelines for writers to ensure quality.

More "bang for the buck." Some issues of Compass have been augmented by displays and posters for use in local and national venues. Current and archived issues of Compass are also available in both PDF and html format from the Station Web site at http://www.srs.fs.usda.gov/compass/ . Web site visitors can subscribe to the magazine online and follow links from the products list to access full text versions of publications. Articles and sidebars from the magazine will be used to build a content database that will further interconnect Station projects, which are in fact highly collaborative. Because of the long-term nature of most Station research, the stories in Compass have a much longer shelf-life than those of popular magazines, and are written to provide usable blocks of information for other science delivery projects.

Internet services

The commitment of the Station to embrace technology that delivers its research products to the widest possible audience is best demonstrated by the Station Web site (www.srs.fs.usda.gov). This Web site offers in-depth information about the Station's areas of research, its scientists and their publications, and special projects and programs Rather than concentrating on portal technologies that compete with other one-stop services, the Station's goal is to attract Google and other search engines by delivering well-branded products that their customers—from congressional staffers to news reporters to forestry professionals—will find to be useful. The Science Delivery Group's computer specialists analyze log files of Web site activity and continually adapt our Web presence on the basis of the user feedback received. This approach has increased our customer base from an average of 200 requests per day in 1998 to a current average of over 20,000 requests by 2,000 distinct visitors per day.

Online publications. When traffic patterns and customer feedback showed that research publications are our most sought-after products, we designed a Web-integrated database to automate the delivery of research publications. This publication database has grown to over 5,500 SRS records with links to over 23GB of full-text publications including Station series publications, journal articles, and other peer reviewed outlets. Users have the ability to view and print PDF versions of these publications and are given the option of ordering hardcopies of our Station series publications. We have also redesigned our system to accommodate other Forest Service research stations, and this database now serves as the platform for TreeSearch (treesearch.fs.fed.us), the Forest Service Web site for one-stop acquisition of research products. TreeSearch contains over 14,000 records with links to full-text publications. Growing daily, it is already the largest known collection of forestry research publications available at no cost. The information contained within TreeSearch maintains individual station identity (branding) but is presented in a unified delivery system for all agency research products.

Forest encyclopedia. The Forest Encyclopedia Network project got its start in 2000 when one of our scientists successfully competed for Federal funding to facilitate the transfer of usable knowledge from

scientific experts to managers, policymakers, and other natural resource professionals. The network has been a joint project of the Southern Research Station and the Southern Regional Extension System (www.sref.info) from its inception. Users of the network are offered what adult educators call a self-directed learning tool that enables individuals to obtain information on an as-needed basis. The Forest Encyclopedia Network currently includes six ongoing encyclopedia modules in various stages of development (www.forestencyclopedia.net): history of forest science, southern forest resource assessment, Southern Appalachian forest management, fire science in the South, bioenergy in the South, and forest threats in the United States. As of the summer of 2006, the system contained 5,236 encyclopedia pages, 2,302 images, 3,912 tables, and 10,903 citations. The network attracts approximately 2.5 million requests per year from 23,600 distinct hosts, or an average of 6,800 requests per day. Encyclopedia modules usually arise from "burning" issues that require rapid synthesis of current knowledge into an easily understandable advice and guidelines. Once identified and funded, a module can be developed "from scratch" by a team of experts or by convening a focused conference on the issue and synthesizing the resulting manuscripts into encyclopedia content. Ether way, all encyclopedia entries are peer reviewed and therefore as credible as any journal article.

Other internet products. Our Web presence also supports science delivery in many other areas. We provide an online **Directory of Scientists**, and this gives our users access to experts in a wide range of sciences that serve forestry. Users are able to browse or search for scientists by area of expertise, title, or research unit and view a summary of each scientist's education, current and collaborative research, and a dynamic link to his or her publications. The **Congressional Corner** provides a State-by-State summary of forest research in the South with information about current projects, awards, and budgets for each research unit and program. The **Study Plan Database** adds credibility to our products by allowing review of the studies that produced them. A **View of Cold Mountain** is a section of our Web site that shows real time air quality conditions in the Southern Appalachian Mountains through a continuous camcorder broadcast supported by measurements of ozone levels, temperature, wind speed, and humidity. A growing part of our Web site helps cooperators and customers navigate the unfamiliar requirements of working with a Federal science agency. Examples include our **Author and Editor Tool Kit**—an online resource for internal and external authors of Station publications—and a **Grants & Agreements** section that defines legal and accounting processes for sharing and transferring resources in research partnerships.

Working collaboratively for improved customer outreach

As a public institution, the Southern Station has responsibility for ensuring that our science knowledge is adopted and used by audiences of all types. This requires continuous engagement by users and potential users in science planning, implementation, and delivery. We intend to ensure that all customers, especially the underserved, enjoy equal access and equal treatment in the delivery of Station products and services. Our goal is to create effective outreach mechanisms, identify barriers to participation, and take affirmative steps to remove these barriers. Achieving this goal will entail a continuing coordinated assessment of target audiences, identification of the most effective means of reaching them, and analyzing the degree to which our scientific knowledge penetrates various populations, again with special attention to underserved audiences.

This is too big a job for any one organization to take on alone. For this reason, we have begun an effort to organize our internal talent—both within the Station and with other Forest Service professionals in the South—and bring in our sister agencies at the State and Federal levels. The first step toward this effort was a joint meeting that brought together more than 80 Forest Service and the Cooperative Extension Service professionals to share successes and begin to define common goals and strategies.

Among the outcomes of that first meeting in August 2006 was a joint commitment to fund a South-wide systematic assessment of target audiences and means of reaching them. With this information, the various organizations involved in science delivery can begin to set priorities for joint projects that make the best use of our individual strengths—be they in publishing, organizing demonstrations and workshops, providing opportunities for direct contact between scientists and users, or producing Web-based tools and information such as syntheses, virtual tours and short-courses, podcasts, interactive learning, and decision tools.

Another outcome is the recent formation of a region-wide science delivery advisory council consisting of representatives from Southern Station and Southern Region headquarters support staffs, research units within Southern Station's five science areas, and the Cooperative Extension Service. This council has three primary functions: (1) to facilitate and coordinate the interchange of information, technology,

and resources; (2) to identify, prioritize, develop, and lead joint outreach and education strategies; and (3) to advise the Station Director and Regional Forester on ways of improving and enhancing science delivery in the South.

Summary

Our Station has a long history of credible science publications, both in journals and in Station series. In response to a changing customer base, the scientific and science delivery staffs are working together to shift the Station's scientific product line so that it incorporates more information about natural resource issues, direct contact with experts, practical tools, and syntheses of research results.

Successful science delivery is not a few people at Station headquarters or the brave work of a few scientists in the field but a coordinated effort that begins with how we organize or research workforce, continues with how we select the hypotheses we will test, and ends with how we select, develop, and test our products and services. The Station's Science Delivery Group will be actively involved in science planning, helping to coordinate stakeholder engagement, identifying products that have potential for delivery, and working with partners inside our agency, in the Extension Service, and in State forestry organizations to craft well focused, user-friendly products. We expect that these products will take many forms including syntheses, virtual tours and short-courses, podcasts, interactive learning, and decision tools and we intend to reach multiple audiences by crafting multiple products from the same information source.

We feel that we bring to the table the credibility of our science, some knowledge of landowner preferences, and a high level of writing, publishing, design, and computer expertise. We look to our partners for expertise in delivery methods, consensus on priorities, and hands-on work to develop and evaluate joint projects that reflect mutual goals.

IUFRO Occasional Papers

The IUFRO Occasional Paper Series was initiated in 1994 and is intended for rapid dissemination of publications reflecting IUFRO activities, reports of meetings, frameworks for Task Forces, and collaboration with other organizations. This in-house publication series has been converted into an electronic series in early 2005, underlining its ambition of bringing forward IUFRO's immediate position on important forest-related issues.

Publications in this series are available on our website **www.iufro.org** under Publications or directly at **http://www.iufro.org/publications/series/occasional-papers/**.

Occasional Paper No. 1 - Global Change and Terrestrial Ecosystems (GCTE) - Effects of Global Change on Managed Forests
Occasional Paper No. 2 - Actas de la Reunión Internacional sobre La Red de Información Forestal para América Latina y el Caribe (out of print!)
Occasional Paper No. 3 - Planning a Conference
Occasional Paper No. 4 - IUFRO Task Force "Forest, Climate Change and Air Pollution" - Final Report of the Period 1991 - 1995
Occasional Paper No. 5 - Do we have enough forests?
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Occasional Paper No. 7 - Perceptions and Attitudes of the Population Towards Forests and Their Social Benefits
Occasional Paper No. 8 - International Bibliography of Dictionaries, Glossaries and Terminological Publications in Forestry and Related Sciences
Occasional Paper No. 9 - Sustainable Forest Management: Contribution of Research
Occasional Paper No. 10 - Financing Forest Sector Research: Theory and European Theory
Occasional Paper No. 11 - Is Sustainable Development of the Russian Forest Sector Possible?
Occasional Paper No. 12 - Global Forest Information Service - Papers presented at the Global Forest Information Service Side Event of the Third Session of the United Nations Intergovernmental Forum on Forests (IFF 3)
Occasional Paper No. 13 - IUFRO Task Force "Forest Science-Policy Interface" - Papers presented at a Side Event of the Third Intergovernmental Forum on Forests (IFF 3)
Occasional Paper No. 14 - Forest Terminology - Living Expert Knowledge. How to get Society to Understand Forest Terminology
Occasional Paper No. 15 - Science and Technology - Building the Future of the World's Forests / Planted Forests and Biodiversity (Contributions to the Third Session of the United Nations Forum on Forests in 2003, Geneva, Switzerland
Occasional Paper No. 16 - Forest Research – Challenges and Concepts in a Changing World. Proceedings of the International Symposium convened on the occasion of the 110th anniversary of IUFRO on 9-10 October 2002 in Vienna, Austria
Occasional Paper No. 17 - Working Effectively at the Interface of Forest Science and Forest Policy – Guidance for Scientists and Research Organi zations
Occasional Paper No. 18 - Challenges and Opportunities of Forest Research in the Policy-Making Process (document only available electronically for IUFRO members)
Occasional Paper No. 19 - Guidelines for the Implementation of Social and Cultural Values in Sustainable Forest Management

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Other publications available from IUFRO:

IUFRO World Series:	**ISSN1016-3262**
IUFRO World Series No. 1	Vocabulary of Forest Management
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IUFRO World Series No. 3	Forstliche Dezimal-Klassifikation
IUFRO World Series No. 4	Long-term Implications of Climate Change and Air Pollution on Forest Ecosystems
IUFRO World Series No. 5	IUFRO International Guidelines for Forest Monitoring
IUFRO World Series No. 6	Perspectives of Forest Genetics and Tree Breeding in a Changing World
IUFRO World Series No. 7	Developments in Forest and Environmental Law Influencing Natural Resource Management and Forestry Practices in the United States of America and Canada
IUFRO World Series No. 8	IUFRO Guidelines for Designing Multipurpose Resource Inventories: A Project of IUFRO Research Group 4.02.02.
IUFRO World Series No. 9 - de	Terminologie der Forsteinrichtung. Entsprechungen in Englisch, Französisch, Spanisch, Italienisch, Portugiesisch, Ungarisch und Japanisch, IUFRO 4.04.07 and SilvaVoc
IUFRO World Series No.9 - es	Terminología de ordenación forestal. Términos y definiciones en español. Equivalencias en alemán, inglés, francés, italiano, portugés, húngaro y japonés. IUFRO 4.04.07 SilvaPlan y el proyecto de terminología de IUFRO SilvaVoc.
IUFRO World Series Vol. 9 - jp	Terminology of Forest Management Planning - in Japanese
IUFRO World Series Vol. 9 - en	Terminology of Forest Management Planning - in English
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