Humble Guide for a Successful Career in Research at Universities

Draft Version

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This document was inspired by a seminar I gave in January and February 2014 at Warsaw University of Life Sciences. The reason for offering this seminar was that academic career advice and mentoring in our rapidly changing scientific world is hardly offered at all and yet so much needed. The advice below is based on experience made by the author at different places in Europe and North America and on discussions I had with British, Estonian, Polish and Swedish PhD students. I keep updating this document on a regular basis so you may like to check out new versions.

The nature of any kind of experience must always be subjective and I fully accept if the reader disagrees with one or another of the points I have made in this document. A lot of them have worked well for myself and every individual needs to carefully check them against his/her own objectives and research environment. My suggestions are intended as "food for thought" and I encourage you to discuss them with others – senior and junior colleagues and friends – in order to draw your very own conclusions in the end. Despite the very best intentions the advice given below can fail to produce anticipated results and the author cannot be held responsible in that case. Also the opinions expressed in this document are my own and not necessarily reflect those of the institutions I work for.

Some of the advice given relates to forest science, however, I believe that the majority of items are also applicable to other fields of natural sciences and even beyond.

Contents

1 PhD studies

The advice offered in this Section is particularly dedicated to PhD students and to those who are considering a PhD studentship. Having said that you will also find suggestions here which may be relevant to postdocs, too.

1.1 Should I really do a PhD?

- Before engaging in a PhD ask yourself the following questions:

    - Do you really need and want a PhD? What are your real objectives (title versus research career as a kind of long-term quest)?
    - Are you a creative person with sufficient imagination and vision?
    - Are you an idealist, a person who is keen on life-long learning?

    Remember that you will never get rich throughout your university career and that the career path can turn out to be "stony" and disappointing at times to say the least. Salaries in private companies are usually much higher and jobs are more stable. However, university careers offer you the unique opportunity of highly creative and inspiring jobs and of enjoying more freedom than in any other type of employment. You have the unique chance of pushing the boundaries of your understanding into unknown territory every day.

    For a long-term career in research and teaching you need to be creative and resourceful. Knowledge and the ability to learn alone is not sufficient. The ability to work independently is also required. PhD titles can be useful for many jobs in private companies and in state administration and it may be your strategy to win the title just as another qualification. Working on a PhD may be a good way of finding out what you really want to achieve in life and what is your personal career path.

    A long-term research career also involves a lot of travelling and living abroad (at least for some time), as the scientific job market is international.

- Never decide doing a PhD just because you need a job. Working on a PhD is something special requiring more than the average attitude towards a job. To be

admitted to a PhD degree programme is a privilege. If you take up a PhD position just for the income both you and your supervisor will eventually be disappointed.

- The time of your PhD work is the time of your life: Never again you will have so much time to acquire new knowledge and skills. Use this time wisely and enjoy it.

1.2 Research topic

- Often the research topic comes with the PhD post and cannot be changed, because funding has been received for this specific topic. In that case you need to consider carefully if this particular topic (and the corresponding position) is really your cup of tea.

- Choosing one's research field is never easy and can determine the course of your career to a large extent. The following questions may be helpful guidance:

    - Do you really feel passionate about the research field proposed to you? Is this "your thing"?

    - As far as you can see now, is this research field/topic nationally and internationally promising/sustainable? Will it help you to develop a long-term scientific career? How many research posts, lectureships or professorships are likely to be available at the time when you will apply for such jobs?

- The selection of a research topic is really crucial. Do not leave this to chance or to personal relationships. Talk to as many people as possible about this. Involve peers and experienced researchers in these discussions but also your family. There is no simple way of giving "watertight" recommendations. Your choice should also reflect current scientific trends, see Section 9.

- Try to engage in or at least to have a foot in basic science (see Section 9, Scientific trends).

- Try to be broad, not only concentrate on traditional topics involving for example timber, trees and forest management (in a forest science context). Engage in interdisciplinary research and also in research communities outside your field.

1.3 Where to go and format of PhD thesis

- Try to do your PhD at a well-respected university different from the universities where you have been awarded your BSc and/or MSc degree(s).

- By all means go abroad for some time, particularly when your kids are still small, provided a good job is offered to you there. Times abroad usually make a positive impact in your cv.

- When you go abroad, learn the national language of that country as this makes the difference between being integrated in society or not. The knowledge of the local language opens many doors that otherwise remain closed. Nobody expects a perfect command of the national language, understanding and getting by is sufficient to show that you made an effort.

- If you have a choice prefer a cumulative PhD to a traditional thesis. *Reasons*: **1.** You publish whilst working on your PhD, i.e. you engage in two important and required activities at the same time. **2.** Your thesis work has already been subjected to a detailed quality check (reviews) before it is submitted to the Faculty and to external examiners. **3.** Chances for unintended plagiarism are reduced. **4.** In my experience, PhD students who have done a cumulative PhD are better prepared for an academic career and are simply better postdocs. There is a clear trend towards cumulative PhDs.

- When doing a cumulative PhD try working on two papers at the same time (but on different days) to ensure a constant flow of publications. Alternate publication projects that take a lot of time with others that require less. You may want to start with a literature review paper first whilst you are still comparatively unfamiliar with the topic. In some countries, review papers are considered as inferior to research papers, however, they are often cited much more frequently than research papers.

- Do not leave the submission of your research papers to journals to the last. Start submitting your papers as early as possible to benefit from the experience of the review process. Getting a paper through a review process is a vital experience and skill. The continuous submission of papers als gives you more job satisfaction ("mission accomplished"). If some manuscripts are still unpublished after

graduation, make sure you get them published afterwards. You really need them and cannot afford giving up on them. Ask your supervisor/mentor to help you with funding during this time, perhaps your department can grant you an extension of your position.

- The most difficult part of your cumulative PhD thesis is the synthesis. This work goes by different names and is usually the first part of your thesis demonstrating how all of your papers are linked. Often students confuse the synthesis with a summary. The synthesis is meant to present your papers in the wider context of the corresponding research community. For this purpose you adopt a kind of "bird's eye" view, characterising the wider research landscape at a higher level and critically show how your papers fit into this landscape.

- Along similar lines as the last item, in your PhD defence you are supposed to give an interesting, challenging research talk quite similar to a conference presentation. Do not present summaries of your papers and particularly do not structure your talk according to the order of manuscripts, e.g. "In paper 1, I carried out.... Moving on to paper 2, I studied ...". Focus on the big picture, the wider research context and present highlights of your research. Secure the support of your supervisor and/or another experienced researcher for coaching you for your PhD defence.

1.4 Other activities whilst doing your PhD

- Build up national and international networks. A good way of doing this is to secure a place in a PhD programme where you have supervisors from two different countries and need to to move, e.g. Fonaso (http://fonaso.eu/).

- Include conference and teaching experience in your PhD studies. Future employers want to see some evidence of this experience. If possible sign up for an assessed (pedagogic) teaching course in higher education and obtain an official certificate. However, do not engage in too much teaching or other activities (e.g. committees etc.), as this may distract you from your PhD work.

1.5 Behaviour

- Always improve your skills in dealing with people and worries on a daily basis. Seek advice and talk to someone about these things.

- Establish relationships and regularly meet with people from other (related) fields of science outside your own, e.g. with mathematicians and ecologists.

- Be always friendly and never intentionally ruin relationships with colleagues. However, always fight intolerable offences such as bullying, sexual harassment etc. and firmly stand up against unjust treatment by peers or superiors, no matter whether this happens to yourself or to your colleagues. Consider your options carefully and before deciding to stand up for your or another person's rights have at least a night's sleep over it and discuss the issue with friends, family and colleagues that you can trust. In some cases, what you have experienced may be based on a misunderstanding or is the result of carelessness rather than of ill intention. In some universities a mentoring system or dedicated staff are in place to informally discuss such problems. However, careful and friendly insisting in your and other people's rights is a fundamental civic duty in support of democracy and freedom.

- Take injustice against yourself or others as an opportunity to learn and to improve things when you come to power so that this world becomes a better place. Definitely avoid adopting the same bad behaviour that you have suffered from yourself.

- Treat every good thing that happens to you (e.g. good supervision and advice) as something you need to "pay back" for through kindness and support to others that are put into your care.

- Treat everybody with respect regardless of rank, be as kind and friendly as possible in all situations, smile when addressing people and make your kindness not dependent on whether the other person is kind to you or on how you feel that particular day.

- Compensate for stress at work by sport. Keep physical exercises going even at the worst of times, never accept excuses. This is an important part of a healthy work-life balance.

- If you are stuck and your mind is blocked, let your task go for a (short) while, take a break, go for a walk and do something completely different. Have confidence in yourself, the solution will come to you before long on its own accord when you are not thinking about the problem.

- If you have difficult, awkward or sensitive matters to discuss (that should not be on record) use the telephone or discuss the matter face to face. Otherwise write short polite emails that give the other person the freedom to deal with the matter when s/he has time to do so.

- Block the time when you answer emails, e.g. at night or early in the morning. Do this only once a day (apart from urgent exceptions). Give only short replies but make sure they cannot be misunderstood. Always start and finish with a nice phrase: "I hope you are doing well.", "It was nice to see you the other day." etc. and "Thank you very much for all your efforts.", "I truly enjoy our cooperation.", "Your advice means a lot to me." etc. and sincerely mean it. Never forget to express your gratitude/appreciation and try to be as polite as possible in all situations. Do not write emails when you are tired, when you feel stressed or when you are in a bad mood. Otherwise answer emails in good time, follow up where there is a lack of response to your emails and be always kind.

1.6 Research advice

- Always strive for independence, i.e. try to establish a situation for yourself where you are not dependent on others for programming, data collection and even not for supervision. You can for example compensate for a lack of supervision by turning to colleagues and respected scholars of your networks or to other members of the supervisory committee. Ensure that even in the worst-case scenario, when things go wrong or turn out badly, you will succeed anyway.

- If your research involves programming and creating experimental software do not spend excessive time in designing nice user interfaces, help files etc. Always remember that the scientific question and the final publication(s) should be at the centre of your attention. Software like R (http://cran.r-project.org/), NetLogo (http://ccl.northwestern.edu/netlogo/) and/or Shiny (http://shiny.rstudio.com/) allow you to develop sophisticated simulation software without much effort. A

larger analysis or modelling software is only worth the effort provided it will enable you to publish at least five significant papers. If your scientific software later turns out to be a major "breakthrough" and "selling point", hire a private company for re-designing and software engineering.

- Carefully consider if you want to engage in long-term monitoring and in the long-term maintenance of a scientific model/simulator or a large data base. These activities require a lot of valuable time and also involve work on aspects of minor scientific importance thus potentially decreasing your publication outputs. Current research policies with project lifetimes of 3-5 years do not support these kind of activities although both certainly have a lot of merits and benefits. Remember that it is also possible to cooperate with people concerned with long-term data collection and to write papers with them. As always it is crucial to strike a healthy balance. Do not engage in research work just for the sake of it, carefully check the potential outputs.

- Never let the question of research methods be determined by how practical they may be for use in practice and industry. The most important consideration is to select the scientifically best method for the problem in hand. It is always possible to identify ways of simplification later or to produce a kind of "data adapter" to facilitate the uptake of your findings by practitioners.

- Do not confuse technical problems with research questions. In some research groups, a specialised scientific software or a monitoring system are maintained that need to cover a whole region or country. In such situations it is not uncommon that "research topics" are proposed with the sole purpose of solving a technical deficiency of the system under consideration. This, however, does not constitute a valid research question unless the technical problem is generalised and the resulting general research question is separated from the technical problem. The technical issue can be solved as part of research dissemination (see Fig. 1).

- If you need to acquire new knowledge for research or teaching, you can consult papers, textbooks and Wikipedia or ask someone for initial advice. Another possibility is to check online teaching programmes including YouTube.
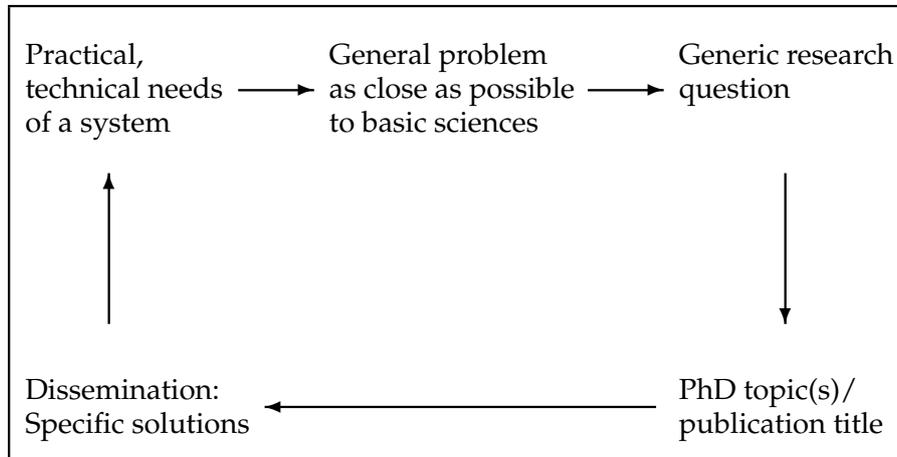
Figure 1. How to turn a practical or technical "research" problem into a real reseach question.

1.7   Research courses

When engaging in a PhD degree you are usually required to collect course credits. Here you need to balance strategic credit collection (how do I get the necessary amount of credits as fast as possible with as little effort as possible?) against the need to learn new skills and to gain knowledge. Later in life and your career it is unlikely that you will have much time to learn new things.

- Many students fall into the trap of believing that a PhD degree is a natural continuation of the BSc and MSc degrees: Just carry on doing courses, then you are fine. This assumption couldn't be more wrong. The most important part of your PhD work is independent research and paper writing. This is not easy to accomplish when you do this for the first time, so get on with this as soon as possible. Also, successful course participation does not guarantee that you will be successful in carrying out your research. Remember that a lack of research work/papers cannot be replaced by course credits. Select courses in such a way that they support your research work. Doing PhD courses is only partially a way of filling educational gaps. Summer schools are designed for filling larger gaps.

- International research courses (e.g. those funded by NOVA in Scandinavian countries) usually operate at a high level and are particularly worth pursuing.

- When realising the need for acquiring additional knowledge (e.g. in statistics or

in another subject area you have not studied so far) there are four main options: (1) Self-study, (2) courses, (4) consultation, (4) publishing with a senior author. Picking up books and studying the new subject matter yourself is certainly a good option and what you have learned while reading these texts will stick for a long time. However, not every student can do this in isolation. Courses are a very good option to gain broad, fundamental knowledge in a new field. Sometimes, however, you are pushed for time or have a certain research plan in mind. In that case a course may be too broad and may take too long. Then a point effort would provide more focussed help like as part of consultation. Finally you can learn by doing and team up with a senior researcher in the new field you are interested in. The senior partner will then guide and teach you whilst you carry out the experiment, do the calculations and write the main text. This is a very good way of learning. All these four options are certainly not successful in isolation and you need to apply a combination of them depending on the situation in hand.

2 Literature

This short Section gives recommendations on how to do scientific reading and on how to deal with journal articles and textbooks.

- Read papers and books first for the big picture, i.e. the research topic, the theories and the outcomes. Start with the summary. Take a break and decide then whether it is worth reading the rest of the publication. Perhaps it is sufficient to read just the bits you need?

- If you are not sure, whether supposedly important thoughts of another person's paper should go into your manuscript, put them into a separate file and "park" them there for later use.

- Keep a central pdf archive of every publication you read. Store their titles in an appropriate front end such as EndNote or Mendeley, to enable you to do quick searches. You can also link these data bases with the one of your supervisor.

- Have your literature archive on your computer and/or a USB stick so that these resources are with you whilst travelling.

- If your university library has not subscribed to a particular journal, ask around in your networks, if someone can organise the paper you are looking for for you. Also ask your supervisor.

- Read scientific papers written by natives also for the way how the paper was structured and which phrases, syntax and words were used. Try to remember them for use in your own papers.

- Always keep your computer in reach when reading a paper: Make digital notes in a computer file, not notes on paper, so that you can copy/paste them for use in your own paper and thus save time.

3 Paper writing

Writing of scientific texts is the foremost task of any researcher. Most of the time we can devote to this crucial activity is about presenting our thoughts and results in the clearest way possible whilst forging an intriguing story at the same time. Here is some advice.

3.1 General advice

- Publications will always stay with you no matter what happens. They are part of your cv. Teaching modules, research plots etc. you often need to leave behind when you move on to another place. Nobody can take your publications away from you.

- Be prepared for the likely situation that most of your research will pass unnoticed by the majority of readers in your research community. However, if you keep publishing there is a fair chance that some of your research work will be appreciated by others and cited. If you do not publish, your research work has no chance at all.

- In many cases writing good papers is possible even without research funding. So do not worry, if you do not happen to have research projects for a while, keep applying and most importantly keep writing papers.

- Package larger research projects in separate, small papers dealing only with one research question at a time. Adopt the habit of writing short manuscripts.

- Select co-authors from which you can learn and from different countries (including UK, Ireland, USA, Canada etc. to secure help with the English language, if this is not your first language).

- Do not do research about too technical or practical things of minor scientific importance (also refer to Section 1.6). The citation indices of your own work can support your decision making.

- Include also data from abroad if possible to avoid the label of a "local study", which is sometimes assigned by reviewers to manuscripts that report on national data only.

- Use every opportunity to improve your English (papers, books, films, conferences, research stays, holidays, sabbaticals, courses etc.).

- Whatever happens in your department and in your life, always assign the highest priority to publishing.

- Though you should publish regularly every year, it is not so much the number of publications but more their quality and the corresponding journal reputation which really matter.

- Try to consider publishing, impact factors and citation indices etc. like a sport. Adopt the habit of loving it. Only if you love something, you will be successful.

- Set yourself a target of at least two English-language publications in ISI journals per year. The number of publications should be evenly distributed over the years.

- Publishing in journals with higher impact factors outside your subject area can significantly improve your career chances. Avoid terms specific to your subject area (or at least define them) and slang used by representatives of your field when submitting manuscripts to such journals.

- Take time to celebrate every published paper. Invite your partner to a restaurant or open a bottle of wine (or whatever you fancy) at home. You truly have deserved this treat and it is important that you have it.

3.2 Authorships

- Publishing is a fundamental right and responsibility. Let no one deprive you of this right and fulfil your publication duties as best as you can.

- A co-author can only be who substantially contributes both to the analysis and to the text. Others who helped or provided data can be mentioned in the acknowledgements. General supervision, participation solely in the acquisition of funding or the collection of data do not justify authorship. Also refer to the Vancouver protocol (http://www.research.mq.edu.au/ documents/policies/Vancouver.pdf) for orientation. All co-authors should be able to give a spontaneous presentation of the major findings of a recent paper if requested.

- Data that have been collected using tax payers' money are public and should be made available on request.

- Do not accept conditions attached to public data such as the inclusion of authors who have contributed to the data collection but have not been involved in the analysis/paper writing.

- The first (and usually also the corresponding) author should be who contributes at least 70-80% of the total work. The last author is usually the head of institute/head of research group, a senior scientist or mentor/professor provided s/he has substantially contributed to the paper. The ranks in the middle are minor ranks in the author list.

- Accept no more than 3-4 authors in total. The less the better.

- It is possible (but not always advisable) to form "strategic publication alliances" with partners in different universities/countries so that you alternate the sequence of authors in order to share the workload whilst ensuring a constant flow of papers.

- While you are not so well-known as author why not team up with a senior author of international reputation.

3.3 Getting started

- Start with a research plan. Sometimes a sketch or a graphical outline is helpful. Then develop the methods and results sections. Abstract, introduction and discussion are the last sections to write. They require a lot of care and often final details are only clear towards the end of paper writing.

- Make a flowchart or graphical sketch of your research/experimental plan and of your research vision. Keep updating it while reading and writing. Later this graphical abstract may come handy in your paper and it will for sure fuel your imagination and creativity. Pin a copy of this flowchart/sketch on a wall where you can see it every day.

- Write short reports about your research progress, not more than 1-2 pages. The reports will help to break down large research projects into small steps, which makes it easier to cope with the workload. You can also share them with your co-authors and supervisors. File these reports and also the comments of your coauthors and colleagues. This paper trail will prove to be a valuable resource later in your career.

- Also write down spontaneous ideas in files that you keep to yourself so that you don't forget about them ("brain dump").

- In many cases, it may be a good idea to write a literature review as your first paper to learn what your research area is actually about and what kind of research has been done already in this field. Literature reviews are usually widely cited by others, so make a habit of writing a review paper from time to time.

A colleague of mine recently commented:

"It seems crazy, but my experience has been the more novel my ideas, the more likely they are to get rejected from publications and the only 2 or 3 papers I've ever just sailed through the publication process were probably my least interesting papers. I have mentioned this to a few people recently and their responses have been: Me too."

3.4 Structuring your paper

- The purpose of the introduction section: **1.** To set the scene and to motivate why this research is necessary (1-2 paragraphs); Motivate and inspire the reader (1 paragraph); **2.** Present the state of the art (3-4 paragraphs). **3.** Give your objectives/ hypotheses (1 paragraph). In total no more than 2-3 manuscript pages A4.

- Attract the attention of reviewers/readers by using inspiring titles. Even provocative questions can very effectively be used as titles. Avoid boring titles such as "On the question of assessing volume ..." or "A contribution to the analysis of ...". Do not be too modest, be self-confident when designing the title of your paper. The title plays a crucial role in determining a paper's impact.

- The discussion/conclusions section should finish with an intriguing and inspiring sentence. The same is true for the abstract.

- If no guidelines are provided by the journal you plan to submit to, structure your abstract as follows: Sentences 1-2 set the context and need for the work; sentences 3-4 indicate the approach and methods used; the next 2-3 sentences outline the main results; the last sentence identifies the wider implications and relevance to management or policy. The final summary point is the most important of all in maximising the impact of the paper. It should synthesise the paper's key messages and should be generic, seminal and accessible to non-specialists (adapted from the Journal of Applied Ecology website http://www.journalofappliedecology-.org/view/0/authorGuideline.html).

- At the end of the introduction all hypotheses and objectives need to be clearly stated. They need to be referred to in the abstract and in the discussion. These three parts of your publication are particularly closely linked.

> **An experienced colleague of mine once wrote about his recent experience:**
>
> "I am just reading a page proof for a publication. Thought the little story may encourage:
>
> The paper is about the contribution of mycorrhizal hyphae to soil organic matter. It is new and controversial. The oddyssey......
>
> Sent to Nature – rejected, not of general reader interest.
>
> Sent to Science, out to review, a big success. Reviewed by 3 refs, two think it is great, one slams it. Rejected. We work on the data. Think the nasty reviewer had made a big error. Resubmitted to Science. Two think it is great, one slams it. Rejected.
>
> Submitted to New Phytologist. Two think it is great, one slams it. Rejected, but please resubmit. Resubmitted to New Phytologist. With extensive answers to referees' comments. Two think it is great, one slams it. Rejected.
>
> Sent to Plant and Soil. One thinks it is great, one slams it. But this time the comments are the most bizarre ever seen. Rejected, but please resubmit. Resubmitted to Plant and Soil. With extensive answers to referees' comments. ACCEPTED!!!!!!
>
> A total process of over 2 years, 6 versions and 17 reviews."

3.5 About text & style

- Several good books have been published on how to do academic writing (essays, theses, papers etc.) using the English language. Purchase at least one of them and use it as a reference.

- When native speakers correct your written English try to make mental notes and to remember the patterns of your mistakes so that every time round you improve your writing style.

- Be mindful of plagiarism and self-plagiarism: It is very easy to commit these offences for a simple lack of carefulness. Make sure that you always give due credit to other people's work and to your own.

- Some journals require you to compile a short list of research highlights. This list

is fundamentally different from the summary: Here you condense the major scientific selling points of your manuscript. They need to be very short and written in the style of an advert for commercial products.

- Your paper should be as clear and concise as possible.

- Do not jump from one thought to another, pay attention to connecting sentences so that your text is easy to follow. Remember that the readers also expect a nice story to be told.

- Do not take common terms and concepts from your subject area for granted. Increasingly many readers may not be familiar with them. Explain and define everything or refer to other papers/textbooks where this is explained.

- Always cite and refer to English language literature where possible. If you need to refer to a national-language sources give additional translations of titles in the references (in square brackets following the original titles).

- Cite and refer to important authors/high ranking journals. For fundamental concepts and definitions cite textbooks rather than papers.

- Never write a manuscript first in your national language and then translate to English. Always try to think in English right from the beginning no matter how bad you believe your language skills are. With every language also comes a different way of thinking that has to be reflected by your text.

3.6 Finishing touches & submission

- Before submission send your paper to colleagues and peers that you can trust for comments. This helps avoiding lengthy and nasty review comments.

- Prior to submission make sure that the language and every other aspect are as perfect as they can be.

- List 4-5 potential target journals and sort them descendingly according to impact factor. Start submission with the top journal, if your manuscript is declined go for the next lower. Have faith and never give up.

- Scientific journals in national languages will most likely disappear before long or be reduced to a very practical and minor role. If possible do not submit papers to such journals, as you can write an English-language paper at the same time. Instead release short research notes or hold workshops for practical dissemination in your national language. A research blog is also a possibility for dissemination.

- If possible do not submit papers to former national-language journals that have (recently) introduced the option of publishing also in English. If you have made all the effort to write your paper in English, definitely submit it to a solid and established English-language (only) journal.

- Preferably publish in established journals with excellent reputation and a longer tradition. Check the impact factor and the associated research community. In my experience open access is a minor consideration unless the funding body requires this.

- Send your published paper to interested colleagues and include a reference to it in your email signature. This may support your citation index and usually leads to interesting follow-up discussions.

3.7 Review process

- Never get disappointed about review comments. Remember reviewers often do this work in their spare time and may just be tired. When you do reviews yourself, try to make a better job and to be more polite.

- Never argue with reviewers. Take their advice seriously and welcome revisions as an opportunity to improve your paper. Even where you disagree make it sound as if you agree.

- If a review was very negative, give it a rest for 1-2 days. Ignore any bad language (noise), concentrate on the positive things, on good constructive advice.

- Even if the editor finally rejected your paper, use the advice given to modify your manuscript before submitting it to another journal on your list.

4 Proposal writing

Given the need of most universities for winning external funds, it is crucially important to engage in writing grant proposals. This is possibly the second most important activity after writing scientific articles. Funding records are often requested in job applications and external grants offer a unique opportunity for building up your own research group and thus to live your own research vision.

- Successful proposals tell an intriguing story and are about solving an important question linked to some theory.

- Secure administrative help from your department, e.g. from a dedicated research office.

- Definitely get someone to check the finances and budgets, as this is usually beyond the training and education of researchers.

- To avoid rejection, get some senior and important collaborators on board including potential competitors.

- When planning your time remember that successful proposals often require nearly as much time as papers. Carefully balance these two activities and cooperate to share the workload. A good track record of successful proposals is important for your career, but published papers are more important. Whilst with the necessary skills and perseverance you can potentially get every paper published, by far not all of your proposals will be accepted. If practical, try to write papers in such a way that some of their materials can be used for a research proposal and vice versa.

- If possible also go for international projects (EU, Interreg etc.).

- By all means try to organise your proposal milestones and deliverables by publications. Avoid lengthy reports to be written. If necessary at all, keep reports short and append your papers/manuscripts.

- Particularly for large and strategically important proposals arrange dedicated meetings/retreats to the process of writing.

- Secure 3-5 letters of support for your proposal from important stakeholders.

- Write/accept research proposals funded by the industry only if this is politically important or when the funders give you sufficient freedom in terms of research objectives and methods. Remember that most such research projects do not provide good material for publications because of data quality and the practical nature of the project. Often universities also appreciate grants from research councils more than grants provided by forest practice irrespective of the amount of money.

- The times when forestry faculties were mainly considered research institutions for forest services or of the forest industry are definitely over.

- Maintain a list that includes both successful and unsuccessful grant proposals to include in your job applications.

5   Teaching

Teaching is an important aspect of academic posts. Making sure that the next generation of researchers and practitioners is properly educated is both a rewarding and an inspiring task. Including one's research in teaching and allowing new research questions to be inspired by student questions is even better. However, increasingly it is important for teaching to be as effective as possible. Here are a few suggestions.

- Organise teaching and teaching preparation so that there are no times during the year when you cannot work on research papers.

- Block your time by setting aside dedicated days when you only concentrate on research, teaching or administration.

- Have at least two research days per week when no one is allowed to disturb you. Spend this time at home, switch off emails and the telephone. Be strict about this, also to yourself. Secure the approval of your superiors for this.

- Despite your interest in good quality teaching remember that research and particularly publishing always comes first.

- Invite colleagues from other universities and from abroad to help share your teaching load. You can have research discussions with these people at the same time and the students love to see other faces from time to time.

- When lecturing keep watching the eyes of your students. When you see they get tired change your lecturing style and try to be more enthusiastic. Occasional breaks and coffee may also help. Walking up and down the class room is also helpful to regain attention. Never raise your voice, rather reduce volume and rely on self-discipline among students.

- Do not lecture in lengthy monologues, adopt a seminar style wherever possible and involve the students by asking questions and by encouraging discussions.

- Praise and encourage every student contribution.

- Speak slowly and in a clear and firm voice. Avoid any artificial style of talking.

- PowerPoint presentations are not always a good teaching tool (google for Power-Point karaoke to get a feeling for the potential for misuse of PowerPoint). LaTeX beamer presentations are often a better alternative. Also consider using the white/-blackboard. "Chalk talks" are often better received by students because of the slow pace of delivery and a somewhat less tiring effect.

- University regulations permitting give your students the choice to attend or not to attend your lectures as this is true academic spirit. Tell them that you are not upset about their absence and that this will not affect their marks, however, that they are fully responsible for their learning success or failure. It is part of higher education at universities that students learn to make best use of their time. This skill will later also be required in their jobs.

- Recommend (but not demand) the participation in field trips and field practicals as students cannot study their contents from books.

- Update your teaching materials from time to time but not every year.

- Include your own research results in your lectures. This is what makes lectures really lively and is truly inspiring for students. They need to feel that they are at university and not at school.

- Always take students seriously, learn their names and use them, address their concerns and answer their questions. Treat them as peers and try to support their studies and their careers as much as possible by using your connections. This is a way of passing on the kindness you have received from your mentors.

- Always write positive and constructive reference letters for your students.

- Prepare the students for examination by limiting the areas they need to revise.

- Encourage students to go through examination questions in groups as part of their preparation. This will reduce the chances of misinterpretation of examination questions and gives ideas for how to answer them. However, such meetings need to be complemented by individual learning.

- Mark student work positively, i.e. not by trying to find mistakes but by identifying evidence for granting them good marks.

- Never turn down students who want to see you and ask for help. However, ask them to make appointments by email and to explain their concerns beforehand so that you can better plan your time and prepare.

- Take notes during the lectures, which slides worked not so well than others. Write down interesting/important student comments/questions.

- You will not fascinate your students with the most elaborate slides but mainly by your own enthusiasm. When the students see that your heart is in the lectures and that you are passionate they will love the topic and learn.

- If possible do not engage in writing substantial lecture notes (scripts). This is valuable time which you should spend on research or on writing textbooks. If in doubt rather write an (English language) textbook.

- Make all your slides and additional material available on websites dedicated to the modules you teach. Also recommend textbooks. Try not to spend excessive time on printing/photocopying material. Encourage students to take the learning material from the module websites.

- If you teach English and national-language classes on the same topics, try to prepare all your teaching material in English to save time and effort. In the national-language classes you can then teach through the medium of the national language using English-language slides.

- Group work is good for more sophisticated tasks and to promote social skills. However, it can present difficulties for assessments. It is important to assign individual tasks to every group member to avoid "free rides" and to ensure just marking.

- Encapsulate difficult theories in nice stories of applications.

- As a result of international trends (see Section 8) we increasingly offer modules to non-specialists. This is particularly common at postgraduate level (MSc and PhD). This trend requires special care in the preparation and delivery of modules, as we cannot assume all participants to have been exposed to the necessary basics. These modules need to be sufficiently self-contained whilst still offering enough new material for students who have already covered the basics. Openly discuss this problem with the students and involve them in finding the best solution.

- Always be open to teaching reviews and teaching observations, when colleagues or pedagogic professionals offer or want to sit in in your lectures. This usually leads to very positive discussions and to an improvement of your teaching. Perhaps you even invite colleagues to sit in and to give you feedback, if there is no such system at your university.

- If you teach multi-national or dyslexic students you may want to offer that your lectures are recorded. The digital records of your lectures can then be posted on the module website and the students can hear your explanations again whilst revising the slides. This is also useful for part-time students and students who missed your lectures for other reasons.

- If you made a mistake and students pick you up on this, admit the mistake and express your gratitude for pointing this out. Stay calm and cool, do not feel challenged, as everybody keeps making mistakes. Remember it is always good to see that students pay attention!

- Many lectures are being recorded these days and you can watch them on YouTube. This is also a good way to pick up interesting ideas and to improve your teaching skills.

- Be careful with volunteering new modules or courses: The offer is usually taken

and it is hard to lose them in subsequent years when you realise that your teaching load is to high.

6   Conference participation

Despite the advances of modern communication technology, researchers regularly need to meet at conferences and workshops. Meeting someone face to face does make a differences and is good for our networks. In the same way it is important to give research talks at international meetings on a regular basis despite good publication records. Here are a few tips.

- The layout of PowerPoint presentations can be very different on different computers depending on versions and operating systems. Try to be independent of such surpise effects by using LaTeX beamer presentations or similar software producing animated pdf files as output. Make sure the conference computer has Adobe Acrobat installed for viewing your presentation pdf.

- When delivering conference presentations never speak longer than the time allocated to you. Take enough time to train yourself in delivering the talk and particularly in finishing on time.

- For training the delivery of conference talks use lecture rooms that are similar to the conference room. Ask colleagues to sit in and to listen. Take their feedback seriously and never speak from written notes.

- On arrival at the conference make sure you can check out the conference venue prior to delivering your presentation. Ensure that the required software is available on the presentation computer and your file works well.

- Always give a talk or a poster presentation at conferences and actively take part in the discussions so that people remember you. Introduce yourself to others during the social events and talk to as many people as possible.

- Flashcards are good for learning and training your research talk prior to delivery. However, never use them in the real talk.

- In the conference talk, only concentrate on the most important issues of your research. Do not give too many technical details. Focus on the highlights and the big picture.

- To every single thought dedicate one slide. Every slide takes 2-3 minutes to talk to. Calculate the number of slides you present based on this and the time allocated to you. Rule of thumb: No more than 15 slides per talk.

- Have "reserve" slides for details that are not included in the main talk. Use them in the discussion to answer method questions.

- Keep your slides simple with only few elements on them and graphs as large as possible with really big labels. Then talk freely about what is not on your slides.

- Do not get tempted to compensate for too many slides by speaking more quickly.

- From time to time re-address people directly to secure their attention (e.g. "Dear colleagues, we now move on to ...").

- Make sure you meet the audience in "their world" at the beginning of your talk and gradually introduce them to your topic. Be mindful of their ignorance and level of knowledge.

- Make a few jokes in between and keep smiling. Convey the passion you feel for your research.

- Look at the audience (left, centre, right, front, middle back), talk to them and never to your slides on the screen. Avoid always looking at the same person.

- Do not "lecture" in conference talks. Remember you give your presentation to experienced specialists who may know more than you.

- Slides and posters should contain as little text as possible. They are visual media, i.e. pictures, graphs etc. play a key role. Give most of the information orally.

- (Moderately) use gestures to support your statements and for securing attention.

- Speak slowly and clearly and give a relaxed impression. If something goes wrong, turn it into a joke.

- Never take questions or criticism personally or consider them as a threat. Thank every person for his/her question and remark. Stay calm and cool. Clearly nobody expects you to know everything. Give every comment credit and state that you wish to take suggestions into consideration in your ongoing research.

- If you have not fully understood a question or need time to consider your answer, re-phrase the question and ask whether you have understood correctly.

- If possible, don't allow questions to be asked during your presentation and kindly ask the audience to wait until the end of your talk.

- If a person asks more than one question at a time, take notes so that you can remember.

- Another way of getting known is to chair conference sessions. This is also an important skill to practise. You need to introduce the speakers and also to ask questions, particularly if the audience have none.

  If you are charged with organising a whole session, first identify the leading authorities relating to the topic of the session. Try to secure their participation early enough. If you are not so experienced, discuss this issue with your colleagues and with leading individuals in this field that you happen to know. Then fill the gaps with local colleagues and with people who have registered for the conference.

  Ask for short cv's of the speakers or better find out about their careers in the internet so that you can properly introduce them to the audience.

  Manage the sessions in such a way that no speaker takes up more time than is allocated to his or her slot. Be strict about this and use signs as warnings to show that only 5 and 2 minutes of speaker time are left. It is crucial to leave enough time for discussions otherwise many talks may pass by unnoticed.

- Many research talks are being recorded these days and you can watch them on YouTube. This is also a good way to pick up interesting ideas and to improve your presentation skills. Inaugurational lectures are particularly interesting.

7 Job applications

One of the great headaches associated with academic careers is the job uncertainty. How long will I be in employment, will my new application be granted, are there any chances to prolong the project? The positive flip side of this is that by moving on to other places you will learn new things and also introduce your methods to another group. Also by now it is common practice for universities to recruit senior researchers from outside the institution to diversify academic life, i.e. there is a reward for moving on in the world. Writing job applications is therefore an important part of our professional lives. Here are some pieces of advice.

- Check job advertisements all the time, never stop.

- Keep applying for academic jobs even if you currently have one: **1.** This is good training. **2.** Your name and what it stands for will be promoted. **3.** You assess your "market value". **4.** A successful application sometimes helps to get promoted at your home university. **5.** You are prepared, if something turns out badly in your current job.

- In the interviews give your very best and convey the impression that this is your "dream job", that you are up to the challenge and that you definitely want the job. Of course, you need to be sure about this yourself. You can always decline a job offer later, first secure it.

- Carefully check out the website and other information of the place you apply for a job. Ask around what sort of employer the new Uni is.

- Go through lists of interview questions to be well prepared. Ask other people to give you mock interviews.

- Find out who are the members of the search committee/the interview panel. Collect as much information on these people as possible. Learn their names and address them by their names.

- Speak to people who work at the Uni where you are applying for a new job and diplomatically ask them to support your application. Use your networks for this purpose. Sometimes it is sufficient to arrange a meeting or to have lunch together without mentioning the job application at all.

- Keep your cv always up to date and keep a register of "brownie points" (keynote talks, invited lectures, guest professorships etc.) and certificates.

- Once a job has been offered to you, you can politely ask if the University would consider to offer or to help with a job for your partner as well (dual career). This is increasingly possible.

- Check carefully, whether the faculty position offered to you is permanent/temporary and whether it is fully funded or whether you need to complement your salary with external research funds. Also check how much teaching is to be expected. Ask for written, signed agreements.

- Avoid superiors which enjoy power. Select idealists, true academics, people who can take themselves back and actively support young researchers. Ask around before signing a new contract.

8   Scientific cooperation

Cooperation is more important than ever. Cooperation is crucial for building, maintaining and extending your professional networks that may give you comfort and support in difficult times of your career. Cooperation stretches from mutual authorships, occasional invitations to departmental seminars or as part of teaching a module to large research projects. Use your imagination and resourcefulness to strengthen cooperation every day. Here are a few suggestions.

- Scientific cooperation is a "must" at all sorts of levels, from faculty and university level to national and international level. This is closely connected to networking, a pre-requisite for successful research. Assign the same importance to all levels of cooperation and maintain them as best as you can. Use every opportunity to establish new ways of cooperation.

- For extending networks, meeting publication requirements and for learning new skills small publication projects involving 1-2 external partners are useful to have on a regular basis.

- Large projects involving many partners are a good opportunity to extend your networks and to engage in interesting interdisciplinary research. Often the sci-

entific outcome does not balance the administrative effort. However, they also require substantial time and work in terms of proposal writing and administration. Working as an administrator for large projects is often a full-time job.

- There are also opportunities for teaching cooperation, not only through distance learning but also through video conferencing. Together with teaching visits by external staff this allows you to share and reduce your teaching load and thus to free up quality time for research. At the same time this is a fantastic experience for students.

- Teaching cooperation can be funded by Socrates/Erasmus, faculty money and by specific educational programmes. Visits and meetings that are part of this cooperation can, of course, at the same time also be used for research cooperation.

- Conferences, workshops and (summer) schools are naturally a good forum for establishing cooperation.

- Do not convey the impression of competition, particularly at local and national level. Always be remembered for your kindness, willingness to cooperate and for sharing resources and information. Never willingly or unwillingly upset anybody.

- Once you have made your first achievements why not set up a website where you describe your scientific area, refer to your publications and disseminate other important information. This is a wonderful service to the scientific communities you are involved in and it helps spreading the word about your work. Your networks also benefit from this activity. If you have developed useful analysis or modelling software offer it for free on your website, e.g. as dedicated R packages, and never charge people for this service. You can be sure that the effort you have put into your software comes back to you in terms of citations and collaboration.

- A scientific blog may also be a good idea of disseminating and extending your research or to communicate your research visions.

- Often you may find that it is easier to cooperate with people outside rather than inside your organisation. This has something to do with organisational tensions, competition, power struggles and fear. Try to be mindful of this.

9 Research trends

Generally speaking it is a good idea to observe research trends and to discuss them with senior researchers. To a large degree the topic of your PhD determines the general research field you are working in throughout your life. Therefore be careful with the selection of your field, since some are more favoured by long-term research trends than others. However, even after a certain research field has been determined there are many possibilities to steer your research into a direction which is favoured by current research trends.

The trends described below have first started in the Anglo-American world and have swept through Europe from West to East for more than a decade. They are expected to take hold of most countries to a larger or lesser degree subject to national and local policies.

- Excellence initiatives and excellence clusters, that have started to be launched 10-15 years ago, promote basic sciences and increasingly dislocate applied sciences like for example forest science. Governments and local universities support these excellence initiatives and try to free up resources from other subject areas.

- The common pattern of restructuring forestry departments:

  1. Forestry departments are re-named (e.g. natural resources, environmental sciences, liefe sciences etc.).
  2. Forestry academics are re-grouped with staff from other disciplines.
  3. Retiring forestry academics are not replaced.
  4. The new department is dominated by ecologists/biologists/conservationists and environmental staff.

  Perhaps the pattern helps to recognise the beginnings of these trends at your university.

- **Reasons for the demise of forestry faculties:** Impact factors and citation indices are now the common currency to prove effective research, more successful publication behaviour of basic scientists, bad publication records of (past) forestry staff including professors, no basic theories in forestry, expensive long-term nature of

forest research involving many observational studies (as opposed to statistically designed experiments) with very few scientific papers as outputs.

- Forest scientists are increasingly treated the same as other natural scientists and forest research is increasingly absorbed by natural sciences. This also applies to the internal or even national assessment of achievements. Often the same output in terms of papers is required regardless of academic fields and their inherent differences.

- Increasingly only journal impact factors and citation indices count in assessing research output and academic performance. Even the contents of your papers are comparatively unimportant, which again suggests that you should "sell" your papers to the highest ranking journals.

- In some countries, universities try to free up time for established scholars by delegating their teaching to teaching assistants. Though this can be tempting I believe that teaching is crucial to good research outputs and increases job satisfaction. Also, students surely want to meet the famous professor they have come for to your university in the first place. The teaching experience is much more valuable for them if the professor includes his own research results in the lectures.

- Due to their broad education, forest scientists are often disadvantaged in discussions about resources and future directions, because they often seek to achieve holistic compromises whilst researchers with different, more focussed backgrounds are used to enforcing their personal agenda.

10   Postdoc time and beyond

The postdoc time is a period of continued qualification between your PhD degree and your first faculty position. What you learn during this time typically complements and extends the skills and knowledge you acquired from your PhD studies. A postdoc period usually lasts for 2-3 years and it is good practice to go abroad for that time or at least to change university.

- Check university websites and subscriptions like science-jobs-de, academics.de, university jobs in sciences (amccarthy@academickeys.com) once a week.

- Collect certificates from different universities with excellent reputation. Do not always stay at the same place, keep moving. In academic jobs, this is now considered as an essential requirement demonstrating a person's flexibility and potential.

- Write or speak to well-known academics in your area and ask if they have or plan for a new postdoc position you can apply for.

- Start looking for a postdoc position 1.5 years before the end of your PhD. It does not matter if some of your papers have not yet been published by that time. Speak to your mentor/supervisor and ask her/him to help you. Don't leave this matter to chance, be proactive.

- Offer to help with proposal writing for your postdoc position.

- Go abroad, particularly to an English speaking country to improve your command of the language of science. Having been abroad is usually viewed positively by home universities you want to apply for jobs later in your career.

- Regularly check websites for open positions and speak to people you meet at conferences/summer schools about this.

- In the worst case accept work experience placements or internships as a starting point. You can then later apply for an open position from "within the organisation".

- Always make sure you check what are the requirements for the next career step. You may need to pass certain courses, get involved in PhD assessment/supervisory committees, write another dissertation, get involved in evaluating degree programmes of other universities, be external examiner among other things. Although many of these activities sadly distract us from the things we are really interested in, they may be necessary to make you eligible for advancing your career, securing permanent employment and/or more academic freedom.

- Review research papers for scientific journals and get involved in the board of a scientific journal. Decline review requests only for very good reasons.

- Invite distinguished colleagues from abroad to your institution and get involved in exchanges/COST actions.

- Organise conferences and workshops. This is a good way of extending your networks and of getting known in your research community.

- Acquire new skills and learn about new subject areas by writing publications with senior specialists in those areas and/or by preparing a new teaching module on these topics.

- Get involved in organisations like IUFRO (International Union of Forest Research Organisations), EFI (European Forest Institute) and BES (British Ecological Society).

- A postdoc period takes 2-3 years and is meant to consolidate the knowledge and skills you acquired during your PhD work. Towards the end of postdoc time you should move on to your first academic/faculty position.

- When you come to power, lead by example and through kindness to everybody irrespective of rank, do not lead by office. People must follow you because they like you and because they trust in your leadership. You must earn the loyalty of your staff, not demand it. Thoroughly prepare for this whilst not in power.

- Remember a university is not an army: Leading by command is not possible and contradicts true academic sprit, you depend on the good will of others and you need to inspire them and to care for them.

- Never try to make your staff work on something they do not like or are not able to do. Recognise their strengths and give them tasks according to these strengths. Above all give them sincere credit for what they do well.

- Keep detailed track records of your annual achievements including publications, (invited!) conference participations, taught modules, invited lectures, reviews (journals, books, proposals), journal/committee work and other activities. This helps you in discussions with your superiors and allows you to do a self-reflection of your work.

11   Differences in university systems

When considering a new position at another university, it is good advice to collect information on the structure of the new place and how things work. This will give you

a good idea about your future working conditions, e.g. how much creative freedom you will have and what the weighting of different academic tasks is like. University cultures can be quite different and it is best to be prepared.

- The most important differences in university systems are between the institute structure and the department structure. There are also hybrid types, of course.

- **Institute structure:** Different subject areas are organised in institutes, which are self-contained units with a full professor as head and PA (personal assistant)/secretarial staff. This structure is typical of continental Europe.

- **Department structure:** No institutes, (full) professors and lecturers represent different subject areas (one-person institutes) with hardly any support other than from project staff. Everything is organised in "pools": academic staff, admin staff, IT staff. This structure is typical of the UK, Ireland, Scandinavia and North America.

- Infrastructure and support is usually better in the institute structure.

- Academic freedom is usually greater in the department structure, it is less power-driven.

- If you feel like a true academic and enjoy not too applied research, avoid working for universities of applied sciences ("Fachhochschulen" in the German, Austrian and Swiss system). On the other hand these universities may be a good choice for you if you do not like writing papers and feel to be the more applied guy. However, carefully consider the advantages and disadvantages.

Any feedback is welcome. Please send your suggestions to arne.pommerening@slu.se.