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Moving People and Knowledge: Scientific Mobility in an Enlarging European Union

A Summary Report

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INTRODUCTION

This report summarises the key findings of a multi-partner[i] project on scientific mobility jointly funded by the UK Economic and Social Research Council, under the Science in Society Programme, and the Anglo-German Foundation.[ii] The study explored the relationship between highly-skilled, scientific migration and the transfer of knowledge within the European Union. It considered the effects of these forms of mobility on the individuals concerned (in terms of their career progression and well-being) and on the selected countries (in terms of scientific development and capacity). It addressed the following questions:

- Who is moving (what are the characteristics of migrants)?
- Why are they moving (what motivates and shapes mobility)?
- How are they moving (how long are they staying; how frequently are they moving; are they returning)?
- What relationship exists between these forms of human mobility and the distribution of scientific knowledge and expertise (can highly skilled mobility generate forms of 'disembodied' knowledge transfer)?
- What would happen if they did not move (would scientists continue to work productively in scientific research in the sending countries and would receiving countries suffer as a result)?

The study examined the movement of natural scientists between two 'receiving' locations - the UK and Germany - and two 'sending' locations - Bulgaria and Poland - and involved a range of approaches including literature review, legal and policy analysis and face-to-face interviews (n=89) with key informants and mobile scientists in the four locations. This summary report outlines some of the key findings and policy implications to emerge from that work.

PATTERNS OF SCIENTIFIC MOBILITY

Analysis of patterns of mobility in the sample indicate an increase in the level of short-term circulation both prior to longer mobility episodes and following returns. The majority of respondents in our return sample - those based in Poland and Bulgaria - were using the mechanism of repeated short-stays to achieve a kind of work-life balance and sustain their scientific productivity and well-being. Even the most apparently 'settled' respondents in the host countries often exhibited a form of 'shuttle return mobility' spending repeated short-stays in their home country. This circulation indicates a strong potential for return and associated collaboration and knowledge transfer should the conditions exist to support the effective re-integration and retention of scientists.

The short-term nature of mobility to some extent reflects the nature of employment positions available in the host countries. 'Foreign' researchers typically occupy temporary, early career positions even when they held more senior positions prior to moving. There was little evidence of direct recruitment of established 'research stars' from Bulgaria and Poland into the receiving countries although relatively senior researchers are being recruited into early career positions.

Undergraduate and doctoral mobility amongst Polish and Bulgarian researchers was somewhat restricted, prior to accession, mainly due to financial issues. However, there are signs that this will increase in the near future with the UK emerging as an increasingly popular destination.

MIGRATION PROCESSES: MOTIVATIONS AND TRIGGERS – PERSONAL FACTORS

Mobility is rarely, if ever, the result of a single 'decision' but rather an on-going reflexive and adaptive negotiation responding to a wide range of shifting stimuli over time and place. Although many scientists do make conscious and planned 'decisions', it is important to recognize the role that serendipity or 'chance' plays in influencing moves and careers. Mobility is often triggered by unplanned, often fortuitous, events. Equally, where a strong migration motivation and careful plans exist, the 'trigger' actioning these may be absent.

The 'expectation of mobility' in science careers is supported by a perception that 'international experience' is inherently valuable. Moreover, mobility is often seen as a tool for selecting the most 'able' candidates. Mobility increases exposure to new skills, ideas and ways of working and, as such, forms a critical means of facilitating the transfer of knowledge. The importance of the 'expectation of mobility' and international experience to career progression in scientific research has led to the characterization of scientists as 'knowledge' rather than 'economic' migrants. In practical terms this manifests itself in the 'pulling-power' of established and resource-rich centres of excellence which contain both the know-how and, critically, the know-who that will enhance scientific productivity and individual career progression.

These kinds of stimuli were certainly evident amongst our sample of scientists. Some individuals developed a conscious strategy focused on building-up their human and social capital through mobility in order to increase their scientific productivity and long term employability security.

Economic factors played a critical role in the majority of cases, however, with moves shaped by concerns around absolute or relative economic circumstances. In some situations scientists faced the prospect of no wages (or employment in other sectors), were struggling with wages that were incapable of sustaining adequate basic living standards (in the absence of 'moonlighting') or wage differentials that supported a significantly higher quality of life.

Additionally, mobility was often the only means of accessing the physical resources that enabled scientists to function effectively in experimental research. It was not so much the desire to access optimal facilities but to have access to basic chemicals and equipment and funding for travel. These concerns do not always lead to longer-term moves. Many scientists in Poland and Bulgaria were using short-stay mobility as a transnational strategy enabling them to work effectively in situ.

The volume of 'early career' entry positions in the UK and Germany coupled with a powerful perception of transparent and meritocratic recruitment, at least in comparison with the situation in Poland and Bulgaria, is a major factor motivating and directing moves. Scientists are both attracted by evidence of objective employment and repelled by experiences of patronage and corruption. This is an important factor facilitating outward moves and also restricting return as opportunities are often seen to 'close' behind them.

Notions of *employability* and security are becoming increasingly popular in discussions about highly skilled mobility. However, the stimulus of *employment* security (having a permanent contract) remains evident. Its effect can be seen most acutely in relation to the impact of retained positions in Poland and Bulgaria. The ability to move for quite long periods without relinquishing a secure and high status, albeit low paid, position in the sending country has an important 'anchoring' effect increasing return potential and connectedness.

As scientists move they accrue 'migration capital'. Moves made early in a career and in relatively protected, 'risk-delimited' contexts, increase the appetite for and confidence to move again. They also generate networks and contacts. This increases the probability of re-migration following return often to the same location.

The characterisation of scientists as 'knowledge migrants', at least in the context of Bulgaria and Poland, amounts to an inaccurate and misleading over-simplification. These scientists are generally more 'pushed' by economic necessity than 'pulled' by the 'lure' of knowledge per se.

FAMILY MATTERS: PARTNERING AND PARENTING

Our findings emphasize the impact that personal and family relationships and obligations have on migration behaviour. Personal relationships both generate resistance to the 'pull' of economic considerations or, in other contexts, lubricate mobility.

Although single, young people show a higher propensity to be mobile, most of our sample were partnered even at early career stage. The overwhelming majority of partnered mobile scientists will be in dual career situations and most of these will have partners who are also trying to develop a career in scientific research.

The presence of a partner can dampen mobility both in the initial stages preventing people becoming mobile at all and, at later stages, in their life course and career. This is especially true for women. Where partnering dampens mobility, it is likely to have a negative effect on career development limiting scientists' ability to work effectively and productively and, in some cases, encouraging 'brain freeze' or 'stagnation'. This situation may be to the detriment of the sending regions to the extent that they are unable to profit from the foreign investment arising as a result of mobility.
On the other hand, the presence of partners in the home country may have an 'anchoring effect' either discouraging mobility or shaping the form that it takes. In other cases, migrant scientists either move with, are joined by or form new relationships in the host country. The effect of post-migration partnering depends on a complex array of factors. Where partnerships form with host nationals there is a greater likelihood that the couple will eventually 'settle' in that location. The prospects of return decline markedly where both partners manage to secure proximate and acceptable employment in the host country and, in particular, where children are present

The pressure on same-national couples to return or move elsewhere is high where one member of the dual career partnership experiences significant difficulties in achieving professional re-integration in the host state. This situation manifests itself in a level of initial 'de-skilling' amongst partners. In the majority of cases, however, this experience was often connected to language skills and was relatively short-lived and partners did manage to re-establish themselves in the host state increasing the propensity to 'settle' at least for a critical part of their productive working lives. The findings emphasize the importance of recognizing the value of the human capital that is embodied in the partners of highly skilled migrants both in terms of the gains to receiving regions and the losses to the sending countries.

The presence of children has an important effect on scientific mobility. Three key concerns emerged; the challenges of organizing childcare in a migration context; the influence of children's educational opportunity on decision-making and the effect of children's social integration on subsequent mobility.

Child care responsibilities generally dampen mobility, effectively 'locking people into spaces' either in the home or receiving country. Academic scientists moving on relatively low wages and with little corporate support often express serious concerns around the provision and cost of childcare in the host countries. The culture of long and unpredictable working hours coupled with on-going work-related travel (often abroad) make this a particularly difficult problem for scientists to manage.

Strategies included the tolerance of separation (involving both parents or of siblings) perhaps using grandparents to provide care, and 'fertility' solutions (postponing parenthood, reducing the number of children or deciding not to have children at all).

Younger, pre–school or primary aged children, are 'easier' to move and parents often felt that their children benefited from mobility at this stage. Concerned about the economic and political situation at home and recognizing the value of educational opportunities, reputational capital and language skills, respondents often placed a premium on mobility for their children increasing the incentives to move.

Children's educational circumstances in the post-migration period frequently trigger a re-evaluation process which often reconfigures family relationships and location decisions quite significantly. Having older (teenage) children in the family increases the propensity to remain for a longer period and restricts return. In such circumstances parents often become 'tied-stayers'.

Given the above discussion, it is not clear to us that scientific mobility is as selective a process as conventional wisdom or popular perceptions infer. The ability to respond to the existence of opportunities abroad is shaped by a wide range of factors and only partially reflects scientific talent or potential. Personal circumstances, including partners and family ties, a commitment to the home country or simply a desire not to be mobile mediate any direct relationship between mobility and scientific excellence. Respondents that exhibited the highest level of circulation often had no partners or children.

THE ROLE OF NETWORKS AND CONNECTIONS IN SHAPING MIGRATION PROCESSES AND EFFECTS

The research examined the kinds of contacts that exist within 'traditional diasporic', 'scientific diasporic' and 'international scientific' communities and examined the factors shaping the growth and effectiveness of these connections. Whilst 'traditional diasporic' connections linking expatriates together in geographical proximity in the host countries do exist in some cases, and may be important to settlement and personal lives, these kinds of contacts are not particularly strong or significant to the professional lives of mobile scientists.

Links with other scientists from their home country through the 'scientific diaspora' are more prevalent and influential. It is useful to distinguish links formed with expatriates in the host countries from those retained or established with scientists in the sending countries. The former are less developed and less 'active' than the latter, often playing more of a social role. There was some evidence of a renewed interest in establishing and reinvigorating links with the scientific diaspora but it was not clear that these networks currently played a major role in shaping migration patterns or 'reverse' knowledge transfer.

Connections with scientists in their home country shape the propensity to return. Without established and carefully nurtured 'anchors' with scientists in the sending regions, scientific labour markets can become more or less impenetrable to potential returnees. Where such networks exist, and particularly where the contact point in the sending country is highly established and active, they have strong potential to shape both return moves and support reverse knowledge transfer (flows of knowledge in the absence of physical moves or between physical moves). These contacts are primarily individual or informal and do not link up 'communities' as such.
Expatriate networks play a major role in stimulating and channelling initial *outward* migrations. They work most effectively when linked into broader 'international scientific' networks. Connections achieved through the social capital of supervisors play a particularly influential role. The interface of these connections between the scientific diaspora and the wider international scientific community, has the greatest impact on migration and represents the greatest potential for effective knowledge transfer.

For the majority of scientists, networks based on the science of what they do and not their national ties are perceived as both more legitimate and more effective. Moving through these 'international scientific' networks does facilitate mobility but in a less spatially defined way with scientists moving across international space.

The opportunity exists for a more positive 'back-flow' of knowledge and expertise. Nevertheless, serious barriers restrict its effective transmission. The dislocation of networks through continued emigration, retirement and scientific decline restricts the potential to retain active links. For connections to function as an effective conduit for knowledge there must be an active and willing agent in the sending country. In many cases this agent will be someone who has 'opted' to move on a shuttle basis rather than for longer periods as this form of mobility enables them to function at an international level.

The practice of permitting scientists to retain unpaid positions in the home country during their stays abroad has an important networking effect in some cases, encouraging them to maintain live connections with their home country and institution.

Analysis of the findings on networks has encouraged us to reconsider the relationship between seniority and brain drain. Although 'losses' of more senior and established scientists, on the face of it, might be predicted to have a more serious impact not least because of the level of investment that the sending country has made in these individuals, the potential for reverse knowledge transfer in such cases is much higher. Early career scientists generally have fewer or less effective networks. Their migration may, in some respects, imply a more permanent and unilateral loss of knowledge and expertise. More established and senior ex-patriots are more likely to have active links with scientists in their home country.

In the *European context*, Bulgarian and Polish scientists are increasingly able to communicate and, importantly, conduct research at a distance. Ultimately, harnessing the potential of the scientific diaspora and international research community demands the existence of a critical mass of powerful and willing anchors in the form of human and physical resources in the home country.

ASSESSING IMPACT: THE EXPERIENCES OF 'RECEIVING' COUNTRIES

The received wisdom, implicit in the 'brain drain' debate, suggests that host countries are the net beneficiaries of highly skilled migration, capable of 'skimming' the cream of employees in competitive global markets. It is clear from the findings that international recruitment is playing a major role in mitigating the problems associated with the declining transition of 'home-grown' young people into scientific study and research and sustaining scientific capacity particularly at doctoral and post-doctoral level.

Assessing the relationship between mobility and quality is highly problematic. Internationalisation in itself is not and should not be taken as an indicator of quality. That said, Bulgaria and Poland present significant opportunities for the host countries in terms of scientific recruitment. The strong reputation in the natural sciences coupled with high transition rates and long and rigorous training programmes generates a valuable pool of potential recruits.

Most respondents felt that EU enlargement would make relatively little difference to recruitment at post-doctoral level and upwards although it is expected to significantly increase undergraduate and postgraduate student flows. The rules governing employment of 'foreign' researchers prior to accession were believed to support a highly competitive situation in which non-EU nationals had to effectively out-perform EU applicants. On that basis, respondents felt that the 'best' scientists were already able to move and deregulation might, if anything, reduce quality.

Respondents expressed serious concerns about transition and progression into more senior positions in the host countries from the perspective of achieving employment security and realising their potential as scientists. In some cases this was linked to a perception of employment discrimination. In practice it is likely to reflect the vagaries of the research systems in the host countries which generate a large pool of highly skilled post-doctoral researchers in insecure and poorly remunerated, 'cinderella' positions. This situation stands in marked contrast to systems in Poland and Bulgaria which generally deliver a much higher degree of security albeit at very low pay.

Foreign researchers often have little awareness of scientific labour markets and career progression systems in the host countries. The association of the UK and Germany with open labour markets and 'fair' recruitment (penetrability) is arguably as much linked to the growth of insecure, contract research, positions as the quality of recruitment processes per se. Progression into established academic positions is governed by more complex rules and often a wider range of skills. This situation is subtly different to progression systems in their home countries and especially in the academies of science.

Our research has brought to light the need for a more open and critical discussion about sustainability and risk-management in the context of human capital in the receiving countries. A critical question is whether a relationship exists between internationalisation and the development of 'home-grown' human capital. Research at national and European level raises serious concerns about the attractiveness of research careers resulting in declining transition rates. The continued ability to recruit from abroad arguably reduces the urgency to respond to these fundamental concerns threatening the sustainability of science. If early career positions are 'appealing' to foreign researchers there is less need to ensure that they are appealing to home-grown researchers. If host countries can attract senior and experienced researchers from abroad into such positions, can labour markets be said to be genuinely 'open' and equitable with sustainable career progression?

Where reliance on international recruitment reaches the levels witnessed in the UK and elsewhere, it is important to begin to plan more strategically for a sustainable workforce. In the words of Hatakenaka (2004: 6): "The future of internationalism is too important to be shaped as a series of unintended consequences of miscellaneous policies or market forces".

THE EXPERIENCES OF 'SENDING' COUNTRIES

Sustainability is more commonly considered in the context of sending regions and features in many discussions around highly skilled migration and the phenomenon of 'brain drain'. The sending countries have lost significant numbers of scientists since the 1990s. However, much of this loss occurred during the initial post-Communist 'transition period' and appears to

have levelled off. A significant proportion of losses were connected to the sudden and marked decline in scientific positions, with many scientists moving to other sectors as well as abroad.

The accounts of our respondents suggest that the sending countries have experienced a significant decline in scientific *potential* as a result on international and inter-sectoral 'losses' and hat the mid-career generation is often thin on the ground with important implications for the training of researchers in future. There is also a sense that migration is selective in its effects resulting in the losses of many high quality and enthusiastic researchers often in specific disciplines and sub-disciplines. Demographic trends including marked declines in fertility and increasing emigration of young people at or before undergraduate level (the 'youth drain') are of growing concern.

The research supports Meyer et al's conclusion that flows are largely unidirectional and go from 'haemophiliac' regions to more competitive places (2001: 309). Although Bulgarian and Polish scientists choose a range of destinations, very few nationals of the host countries spend time working in labs in Poland and Bulgaria. To the (still limited) extent that foreign scientists are beginning to study and work in Poland and Bulgaria they are likely to come from 'weaker' regions. While the general view is that significant levels of outward mobility pose a serious threat to science infrastructures and competitiveness, the research also indicates potential mitigating factors and positive returns. Large flows of people who have been educated in the home country do represent a significant loss in investment. However, most respondents were the beneficiaries of continued, often more specialised, investment abroad.

Whilst investment in R&D is critical to the emergence of a competitive knowledge economy, it is less clear that migration, in itself, restricts regeneration. The alternative to migration is often not the effective deployment of human capital. A far greater number of skilled scientists exit the sector to remain in their home countries but work in another capacity and are often deskilled in the process. Others attempt to combine scientific research with other employment restricting their ability to work productively and achieve an acceptable balance in their lives.

Mobility, in many respects, is the life-blood of science in Poland and Bulgaria. Mobility and international connections offer opportunities for sending country to enrich their 'brains' abroad and benefit, eventually, from the investment made in them there. The opportunities associated with international mobility are often the primary means of attracting young people into and retaining more senior people in science research. Short-term moves provide a means of increasing scientists' access to critical resources enabling them to both lift themselves and their families into an acceptable standard of living and work effectively and productively.

Our work is couched within a broader discussion of the tensions inherent in European Union research policy. On the one hand, the commitment to the freedom of movement of European citizens and individual equity in employment opportunity lies at the heart of European integration. On the other, concerns around the consequences of free and open labour markets, in the context of significant persistent diversity in economic capacity between the Member States, raise questions about balanced growth and regional equality.

Historically the 'brain drain' debate has tended to focus on movements of highly skilled people either from Europe to the United States or, more recently, from developing countries into Europe (and the developed world more generally). In recent years, greater attention has been paid to East-West flows in the European context and the impact of these on sending nations. The accession of some of these countries into the European Union implies a more complex analysis. Indeed, it has been argued that analysis of these flows must now be considered as a dimension of 'internal' or 'inter-regional' migration within the European Union rather than international migration between individual nation states. Processes, such as scientific clustering and specialisation and the mobility that goes with these, which may appear to be detrimental to individual nation states may augment the competitiveness of the EU as a whole. Nevertheless, the persistence and arguably the exacerbation of regional equalities that form the necessary 'exhaust' of these policies raises difficult political questions for the European Union. One 'approach' developed in the context of highly skilled migration from developing countries is to attempt to restrict mobility or at least active recruitment campaigns on the part of host countries through the introduction of 'ethical' recruitment policies.

These policies are not appropriate within the EU and would generate new forms of opposition particularly in the political climate of the new Member States in Central and Eastern Europe. Any measures which could be interpreted as restricting the access of European Citizens from opportunities to move and work in other Member States – or restricting the right of employers to advertise positions and seek to recruit from the wider European labour market, would be seen as fundamentally discriminatory. This view was expressed unequivocally by the respondents in our study.

The research presents evidence of a high degree of circulation and connectedness and, importantly, an even greater propensity for this pattern of behaviour should conditions exist to support it. Very many respondents expressed a willingness and desire to increase their connections with their home country and spend more time working in or working with scientists there. In many respects the significance of place of residence is declining, at least in terms of scientific productivity, as new opportunities emerge supporting distance-working, circulation and international collaboration.

Short-stays provide opportunities for networking, experimental work, collaboration and project-building. They also increase the opportunity for people who, for personal reasons, are unable or unwilling to make longer term moves. This includes both scientists 'stuck' in the sending regions unable to work as productively as they might and scientists in the receiving countries who might profit from short-stays in Poland and Bulgaria.
Scientists in the sending countries would also benefit substantially from an increase in the level of funding provided to support foreign visits enabling them to attend conferences abroad and also to organise seminars and conferences in their home institutions. Increasing this kind of activity is relatively inexpensive and has the potential to increase the attractiveness of positions and scientific productivity.

Funding bodies at national and European level might usefully consider the value of shifting the emphasis from longer fellowships in order to increase the availability of funding for shorter stays and shuttle moves.

An important factor emerging from the study concerned the 'quality' and penetrability of national labour markets. Scientists are attracted by objective recruitment systems. The continued influence of patronage and 'closed' forms of recruitment and progression constitute a powerful factor motivating people to leave (and restricting entry and return).

Sending countries need to address their approaches to recruitment and employment opportunity and develop more transparent and merit-based systems in compliance with European Union employment law. In so doing they need to encourage both their own ex-patriots and foreign researchers to spend time in their institutions.
Despite the massive decline in positions post-transition, significant over-supply continues to exist in some institutions in Poland and Bulgaria reducing efficiency and restricting the availability of new opportunities for early career researchers. In particular, attention needs to be paid to performance management and to the ageing of academic staff and effective retirement policies brought into play (in compliance with recent EU legislation designed to prevent discrimination on the grounds of age).

The role and value of retained positions in the home countries raises a number of interesting questions. On the one hand, it is clear that they provide important 'anchors' to the home country increasing the potential for physical return, collaboration and knowledge transfer. However, they also contribute to the phenomenon of 'position-blocking' especially when positions are retained for many years and home institutions are either unprepared or unable to replace staff at the appropriate level (generating new opportunities and safeguarding the quality of teaching and research).

The importance of retained positions to Bulgarian and Polish scientists is increased by the dominance of insecure, fixed-term, employment in the host countries. The experience of contractual insecurity and uncertainty over the prospects of securing permanent positions in the host countries increases circulation. In one respect this could be considered a positive factor increasing the propensity to return. On the other hand, it also generates retention problems in the host countries and raises questions about whether the scientific potential that host countries invest in is utilised optimally.
The effect of recent European Legislation designed to regulate the abuse of fixed term contracts remains to be seen. Although the legislation only came into effect in the UK in July 2006, it appears to be having a fairly marked impact on the proportion of fixed term employment in the university sector although its full effect on externally-funded research only posts remain unclear.

SOME CONCLUSIONS

Our research supports the conclusion that the concepts of 'brain drain' or brain gain' are far too simplistic to capture the dynamics of highly skilled, scientific, mobility. There is not a 'migration' as such but an on-going flux and circulation with scientists engaging in dynamic and diverse ways with other individuals and institutions on an international basis. In some cases or for certain periods of time, the opportunities available might restrict this activity to forms of electronic or 'virtual' connections or occasional conference attendances whilst in others, scientists may work in close collaboration with a particular lab abroad or spend their whole lives relocating across geographical space. Internationalisation is a continuum and its specific manifestation reflects a range of factors. Life course considerations and personal concerns may modify the level of engagement over time perhaps moving from a lengthy period abroad at early career level followed by return and limited travel coupled with remote forms of communication and collaboration and eventually a resumption of more active mobility before retiring in the home country. The nature of their scientific project and the importance of mobility and collaboration to its success is also a critical factor. In some fields or for certain periods of activity, scientists can work well on a remote basis. In others, they need to access equipment and know-how critical to their research.

One of the most important factors remains the issue of resources including personal financial well-being (an acceptable salary and standard of living) and the resources necessary to support scientific productivity and excellence. The economic situation in the sending countries, and Bulgaria in particular, and the serious lack of resources lies at the heart of the 'problem'. This is not simply a matter of economics, however, but also of politics and the specific priority attached to scientific investment. Both Poland and Bulgaria have experienced a marked and continued decline in the proportion of gross domestic product (GDP).

The positioning of individual scientists on the continuum of internationalisation at any point in time reflects the interplay of these diverse factors and determines the potential gains and losses both to themselves and to the countries concerned. If the resource framework fosters engagement with the home country it will take place in one form or another. In some cases scientists will be motivated to remain resident and employed in their home country through opportunities to travel and collaborate with researchers abroad. In others, for various reasons, they may decide to locate their families abroad and take residence there, for a time at least but use the resources available to engage actively with colleagues in their home countries enriching scientific exchange and output in both locations.

The research emphasizes the importance of understanding the political context within which debates about brain drain are situated. Various authors have hinted that the brain drain debate, in the sending countries, might be distorted by political objectives operating as a form of 'smoke screen' concealing the underlying causes of scientific decline. Gächter notes (2002: 53):

> Bulgaria has not been suffering a decline in national development potential from emigration…'brain drain' is far too big a word to describe what is happening. If there is a science problem for the nation, it is excessively low wages necessitating non-science work on the side which eats into time devoted to research, and, second, the totally inadequate funding of research facilities.

Or, as Eugenia, a Polish post doc in the UK, puts it:

> The problem is not for the individual but for the politicians. They simply have to create a labour market for scientists in Poland otherwise all the scientists will go abroad.

The European Research Area has increased the opportunities to move to and fro for the purposes of scientific research and access employment opportunities in other Member States. It has also played an important role in funding scientific mobility and fostering the growth of Centres of Excellence. These activities, in themselves, do not exacerbate forms of 'brain drain'; rather they generate new and more fluid resource frameworks and critical opportunities for investment in scientists in the new Member States. The onus lies on the Member States to respond to these developments and develop policies designed to harness this investment and stimulate opportunities for connections and collaboration.

REFERENCES AND NOTES

Gächter, A. (2002), 'The Ambiguities of Emigration: Bulgaria Since 1988', International Migration Papers, 39, Geneva: International Labour Organisation.

Hatakenaka, S. (2004), Internationalism in Higher Education: A Review, Oxford: Higher Education Policy Institute.

Meyer, J-B., Kaplan, D. and Charum, J. (2001), 'Scientific Nomadism and the New Geopolitics of Knowledge', International Social Science Journal, 168: 309-321.

i Anna Kicinger and Marek Kupiszewski, Central European Forum for Migration Research, Warsaw acted as Polish partners and Nikolina Sretenova, Bulgarian Academy of Science, as the Bulgarian partner.

ii The ESRC funding relates to Project L14425004 and the AGF funding to Project 1468.

FURTHER DETAILS

A book based on the research - *Moving People and Knowledge: Scientific Mobility within an Enlarging Europe* by Louise Ackers - is due to be published by Edward Elgar shortly. For details of this and other publications based on the research please contact:

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