Regional Consultation on Genetically Modified Cotton for Risk Assessment and Opportunities for Small-scale Cotton Growers
CFC/ICAC/34FT

Fast Track project

Project Executing Agency:	International Service for the Acquisition of Agri-Biotech Applications (ISAAA) **i**n collaboration with National Institute for Biotechnology and Genetic Engineering (NIBGE), Faisalabad, Pakistan
Location of the Project:	National Institute for Biotechnology and Genetic Engineering (NIBGE), Faisalabad, Pakistan
Total cost:	**US$160,000 ($120,000 from CFC, $40,000 as cost-share)**
Duration:	Eight months (1 November 2006 to 30 June 2007)
Proposed Date:	March 6-8, 2007
Project Supervisory Body:	International Cotton Advisory Committee (ICAC)
Main theme:	Genetically engineered cotton is spreading in spite of the fact that many governments are reluctant to approve commercial production. While the technology has great potential, there are genuine concerns about this technology. Blank acceptance of this technology cannot be granted because of its situation specific benefits. The project will bring together government/private officials related to decision making on the issue and share with them the experiences in other countries. The project will focus on identifying the opportunities and challenges to adoption of biotech cotton in key cotton growing countries in Asia and Eastern and Southern Africa. The main theme of the project is to share information on benefits and possible risks to small scale farmers in the two regions from the use of biotech insect resistant cotton. Impact on the environment, risks to consumers and genetic diversity will be discussed as well as biotech claims that insect resistant GM varieties save the environment from injurious chemicals by halving the use of insecticides, and reduce the chemical exposure of farmers, with documented benefits to human health.

Regional Consultation on the Genetically Modified Cotton for Risk Assessment and Opportunities for Small-scale Cotton Growers

I. Proponent

The International Service for the Acquisition of Agri-Biotech Applications (ISAAA)

ISAAA is a non-for profit organization aimed to deliver the benefits of new agricultural biotechnologies to farmers in developing countries for poverty alleviation. ISAAA's information sharing initiative is the Global Knowledge Center on Crop Biotechnology (the KC), a science-based information network that promotes the public understanding of the benefits of crop biotechnology applications in promoting improved agricultural practices that lead to increased food security, poverty alleviation, and a more sustainable use of natural resources. ISAAA has been actively pursuing the adoption of biotech crops in the world since the development of this technology. The annual publication of ISAAA—Global Review of Commercialized Transgenic Crops—which is published every year, provides an excellent analysis of the current situation in commercialized biotech crops. In 2001 ISAAA devoted the annual brief to cotton. The publications and work of ISAAA are recognized in the research community. ISAAA also has a good experience of working with national and international organizations for organizing discussion forums like the one presented in this proposal.

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II. Host Organization

The National Institute of Biotechnology and Genetic Engineering (NIBGE), Faisalabad, Pakistan will host the regional consultation. NIBGE is a subordinate institution of the Pakistan Atomic Energy Commission. NIBGE deals with all crops including cotton, and in the past has served as a Project Executing Agency for the CFC/ICAC 07 'Genome Characterization of Whitefly-Transmitted Geminivirus of Cotton and Development of Virus-Resistant Plants Through Genetic Engineering and Conventional Breeding." Dr. Yusuf Zafar, Director NIBGE, has confirmed to ICAC that NIBGE is willing to serve as a host organization for the regional consultation.

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III. Biotech Cotton in the World

Bt cotton is a cotton variety that has been genetically engineered with the insecticidal gene from the soil bacterium *Bacillus thurengiensis*. The transgene produces a protein that paralyzes the larvae of pest insects, including the cotton bollworm and the Asian and European corn borers. It is highly specific to the target organisms alone, and numerous scientific studies have indicated that Bt has no adverse effects on human health and the environment, making it an ideal biological pest control tool in integrated pest management practices.

Bt cotton was initially introduced in 1996, and in the first decade of its commercialization it was cultivated in an area of over 20 million acres in the world (*1*). According to a recent study (*2*), Bt cotton contributed US$ 8.12 billion to the cotton sector in countries adopting the technology (8 in 2005), which is equivalent to adding nearly 12% of the cotton crop value in these countries, or 5.8% of the US$ 28 billion value of the global cotton crop production. The economic contribution of Bt cotton stems from both increased yields and reduced costs, and all the countries adopting Bt cotton have benefited from the technology (*2*).

The adoption of Bt cotton has also resulted in significant, measurable improvements to the environment. The environmental gains for Bt cotton are estimated to be the largest of all biotech crops on a per hectare basis, and between1996 and 2004, farmers used 77 million kg less insecticide in biotech insect resistant cotton crops (a 15% reduction), and reduced the environmental footprint of cotton cultivation by 17% (*2*). These estimates do not take into account the indirect beneficial effects of the use of Bt cotton, which are nonetheless important factors for the adoption of the technology by farmers. These include the facilitation of reduced, no-tillage systems, reduced productions risks and exposure by farmers to pesticides, and improved crop quality.

The first cotton varieties engineered with Bt (Bollgard Bt cotton), were commercialized by Monsanto. Many countries in Asia including Pakistan and Uzbekistan have invested a significant amount of human and financial resources for the development of local genetically modified cotton varieties. In April 2006, the National Institute for Biotechnology and Genetic Engineering (NIGBE), the agricultural research arm of the Pakistan Atomic Energy Commission (PAEC), announced the development of an insect-resistant cotton variety. An application has been filed for the National Biosafety Committee for approval of the GM cotton seed variety. The project was funded by PAEC, the Agriculture Department of the Punjab Government (Pakistan), by the Common Fund for Commodities (CFC), and by the International Cotton Advisory Committee (ICAC). The legal and regulated cultivation of Bt cotton is expected to half the import of pesticides.

ICAC estimates that 28% of the world cotton area was planted to biotech varieties in 2005/06, and that this area contributed 37% of the world production. In addition, 38% of the cotton traded in 2005/06 is expected to be biotech cotton. In India, 14% of the total area was under biotech hybrids that benefited growers through increased yields by providing better protection against bollworms. Millions of growers in China (Mainland) have benefited from this technology where biotech area increased to 70% of the total area in 2005/06.

In the Eastern and Southern African region, South Africa has already commercialized biotech cotton. Only Deltapine varieties have been engineered and these varieties were planted on over 90% of the cotton area in South Africa in 2005/06. Small growers have taken the maximum benefit of this technology and a significant impact on national average yield in cotton is a strong proof in this regard. Lately, the Government of Uganda has allowed field trials on biotech cotton. Trials have also been conducted in Zimbabwe in the past but biotech cotton is still not approved. Other

countries in the region have shown a lot of interest in biotech cotton in the ICAC meetings and at various other occasions. One of the limitations is the transfer of Bt genes into local germplasm. High cost of technology is another issue but misinformation on benefits as well as risks is hindering governments to make decisions.

IV. Potential Risks of Biotech Cotton

Biotech cotton is stated to be a success story by many standards. Global studies on Bt adoption indicate that China (Mainland), and specifically small-scale growers, benefited the most from the adoption of Bt cotton. By contrast, reports published in India show the most controversial situation among the eight countries that have adopted biotech cotton. The controversy is caused by vested interest groups on both sides, for and against the technology. ICAC's Second Expert Panel on Biotechnology in Cotton (report available at http://www.icac.org/) refers to some of the concerns, but a more detailed report 'Concerns, Apprehensions and Risks of Biotech Cotton' has been published in the ICAC RECORDER (*3*). The concerns covered include (but are not limited to): gene action misuse (like Technology Protection System); organic cotton-disincentive; the development of resistance to toxins; the perception of biotechnology as an unproven technology; the use of illegal biotech cotton and its consequences; the lack of knowledge and over cautiousness about the technology; complex changes in pest populations; technological limitations of the application; and private ownership of the technology.

V. Project Background

Benefits of growing biotech varieties are apparent. The most prominent benefits are lower expenses on insecticide (particularly Australia and the USA), higher yields (particularly India and South Africa), and a safer environment (Australia, India and China-Mainland). A mix of benefits has been achieved in other countries including Colombia and Mexico. Minimum use of insecticides has multifarious advantages in the form of less human poisoning, lower yield risks and confidence to invest in other inputs. In spite of all these benefits, many countries, including Pakistan and Turkey in Asia, have not yet adopted biotech cotton on a commercial scale. The possible reasons for non-adoption are:

1. Biosafety regulations are not in place in most Asian and African countries to govern the importation, testing and use of this technology.
2. Many governments and countries remain suspicious of the technology. They believe that biotechnology is a consumable technology, like some others (such as pesticides), and is ultimately going to disappear.
3. Benefits of the technology are not consistent and have not been clearly explained or understood.
4. Countries do not have the technical capabilities to develop their own biotech genotypes, and thus rely on products developed by private companies who charge a high fee for the technology.
5. It is not clear how to access this technology as the arrangements between companies and governments that have commercialized biotech cotton are not publicly available.

The project will focus on these issues and arrange to share experiences from other countries, particularly developing countries. The project will promote direct open discussions with government authorities responsible for making decisions on the issue in the region.

VI. Cotton in the Consultation Host Country

Pakistan is the fourth largest producer of cotton in the world, the third largest exporter of raw cotton, the fourth largest consumer of cotton, and the largest exporter of cotton yarn. Approximately 15% of the area under cultivation in Pakistan (over 3 million hectares) is planted with cotton by 1.3 million farmers (out of a total of 5 million). Millions of people are employed along the entire cotton value chain, from weaving to textile and garment exports, and depend on this crop for subsistence. Cotton and cotton products account for 10% of the GDP, and for about 60% of the foreign exchange market. In addition, cotton supports Pakistan's most important industrial sector, the textile industry.

Pakistan yield per hectare ranks 13th in the world, and as a result Pakistan annually imports around 1.5-2.00 million bales of cotton to meet growing demand from local textile mills. It is therefore vital for the economy of Pakistan to increase its yield per acre for cotton.

Bollworms cause a major loss to yields in Pakistan, and these represent the target pests controlled by biotech cotton having either the Cry1Ac or Bollgard II events, which represent dual action insect resistant cotton varieties. While farmers are keen to try biotech cotton, the government has yet to make a decision on the technology. It is expected that the anticipated technical exchanges will provide the knowledge and experiences from other countries to allow Pakistan to make an informed decision based on science and authoritative knowledge.

Pakistan is at a more advanced stage to embrace this technology compared to Uzbekistan, the next largest cotton producing country in the world after Pakistan. Other Central Asian cotton producing countries, Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan and Turkmenistan are yet not prepared to adopt this technology. Turkey is a potential user as, unlike the Central Asian cotton producing countries, the target pests cause huge losses to yields in Turkey. Pakistan has been selected to host the workshop because of the maturity of the issue in the country, the position in cotton production, the geographical location in the region, and the status of biotechnology research on cotton.

VII. Cotton in Southern and Eastern Africa and the Challenges of Adopting Biotech Cotton

Bt cotton in South Africa was the first commercial release of a GM crop variety in the continent, and to date South Africa remains the only African country to cultivate biotech crops commercially. The adoption of biotech cotton varieties was prompted by the fact that the average cotton yield in South Africa was one of the lowest worldwide.

In 1999/2000 a total area of 50,000 ha of Bt cotton was grown in South Africa by 1,530 commercial farmers and 3,000 small-scale farmers, mostly under dryland conditions in the Northern Province, with some in KwaZulu-Natal and the Free State. South Africa also granted in 2000 approval for biotech cotton varieties with resistance to glyphosate, the active ingredient in the herbicide Roundup.

Among the most damaging cotton pests in South Africa are the bollworm species: American bollworm (*Helicoverpa armigera*), Red bollworm (*Diparopsis castenea*) and Spiny bollworm (*Earias biplaga* and *E. insulana*). Labor availability is an important constraint to production for resource-poor South African farmers, as male members of households are often absent, and

therefore production frequently falls in the hands of women. In addition, insecticides are mostly hand-sprayed by small growers.

A study reported significant, substantial and consistent benefits of adopting Bt cotton for resource-poor smallholders in the Makhathini area of South Africa over the first three years of adoption. Benefits were largely in the form of increased yields, reduced pesticides and labor for spraying that, despite higher seed and harvesting labor costs, resulted in substantial improvements in gross margin. The study also suggests that those benefiting most from the technology were the smaller and more intensive cotton growers. The reduction in the number of sprays was particularly beneficial to women who do some spraying and children who collect water and assist in spraying.

The authors estimate that in the 1998/1999 season, around 12% of the 1,376 farmers growing cotton in the Makhathini region had adopted this Bt variety, and in subsequent seasons this increased to 40% (1999/00) and 60% (2000). However, challenges remain: the understanding of refugia and their management by local farmers are deficient and need improving.

In East Africa there are three countries with cotton areas ranging from approximately 30,000 to 400,000 hectares that are potential beneficiaries from Bt cotton, but currently do not have access to the technology for various reasons. These include Tanzania (392,000 ha), Uganda (200,000 ha), and Kenya (30,000 ha). These countries, among many others in the region and the whole continent, have also expressed a high level of interest in testing and possibly adopting the Bt cotton technology. Kenya, for instance, has just completed its first field trial of Bt cotton. Learning from the experiences of other developing countries in overcoming the various challenges to Bt cotton technology introduction and adoption and eventually achieve the commercial approval and use of the technology will be very beneficial to the hundreds of thousands of small-scale cotton farmers in these countries and the rest of the region.

VIII. Objectives:

The regional consultation has the following specific objectives:

- Assist in bringing information on the benefits associated with Bt cotton (which has already benefited many countries) as well as the associated risks to small growers in more Asian and African countries by providing an authentic platform for free and frank discussion on biotech cotton.

- Facilitate a better understanding of a science-based regulatory system that could be implemented in countries for a responsible and effective oversight of biotech cotton. The regulatory system should be commensurate with the resources that specific countries have to assign to this task

- Provide an understanding of patents and intellectual property protection law, and propose practical ways in which countries could negotiate access and usage of proprietary genes for incorporation in well- adapted local cotton varieties developed by national programs in various countries.

- Analyze the key elements involved in the successful implementation of a national program in developing countries to commercially produce biotech cotton

- Identify major elements that led to the successful commercialization of biotech in China (Mainland) and India in Asia, and South Africa in Africa.

- Examine the current status of biotech cotton research in the region and identify major constraints and challenges that need to be addressed should countries wish to pursue access to this technology for the ultimate benefit of resource-poor cotton farmers.

- Examine trade implications for biotech cotton in the world market

IX. Planning of the Regional Consultation

Access to science-based authoritative information, knowledge and the sharing of experiences on the benefits and impacts of biotech cotton would assist the relevant authorities in Pakistan and in other countries in Asia and Eastern and Southern Africa in decision making processes regarding biotech cotton technology. Pakistan and other Asian and African countries would benefit tremendously from the experiences of both developed and developing countries, in particular India, China (Mainland) and South Africa that have successfully adopted biotech cotton. The availability of sound information on biotech cotton is also essential to dispel misunderstandings regarding the use of the technology, to highlight real concerns and to encourage public understanding of biotechnology and its potential benefits to developing countries.

A three-day regional consultation and workshop will be conducted at the National Institute of Biotechnology and Genetic Engineering in Faisalabad, Pakistan. The Consultation will bring together national and international cotton experts to discuss selected issues. Participants will include key policy makers, scientists and members of the cotton industry from the two regions, representatives of the private sector involved in biotech issues, and recognized international experts outside the region on selected topics. The National Institute for Biotechnology and Genetic Engineering of Pakistan, headed by Dr. Yusuf Zafar, has agreed to organize the regional consultation from March 6-8, 2007.

The consultation and workshop would conform to the mandate of both ISAAA and ICAC: to provide relevant, scientific information aimed at assisting governments for a transparent and informed decision making process. The workshop would therefore not have an advocacy role, but promote instead the sharing of information.

Program for the Regional Consultation

ISAAA in consultation with NIBGE has prepared a three-day provisional program for the consultation. The program will be further improved in consultation with the ICAC and CFC and the approved program by both the ICAC and CFC will be implemented. Utmost care will be taken to avoid misuse of the forum by companies (for and against) to promote their agenda. The draft program is shown in Section XII of this proposal. Participants will be invited from all cotton producing countries in Asia (Bangladesh, China (Mainland), India, Indonesia, Iran, Iraq, Kazakhstan, DR Korea, Pakistan, Philippines, Syria, Tajikistan, Thailand, Turkey, Turkmenistan,

Uzbekistan, and Vietnam) and the cotton producing ("anglophone") African countries (Egypt, Ethiopia, Ghana, Kenya, Mozambique, Nigeria, South Africa, Sudan, Tanzania, Uganda, Zambia, and Zimbabwe). The focus for Africa is on "anglophone" countries in view of the fact that the workshop will be conducted in English. A workshop for "francophone" Africa is being considered as a separate event. CFC contributions to cover participation costs for one or two identified participants will only be used for participants from CFC member countries. Participants from non-CFC member countries and company people will fund their travel and attend the consultation.

X. Anticipated Outcome and Impact

- Better understanding of the key elements and requirements for a successful assessment, deployment and adoption of biotech cotton technology
- Proper assessment of possible risks and opportunities of biotech cotton.
- A framework or a road map for commercial use of biotech cotton technology in developing countries in Asia and Eastern and Southern Africa.
- All the papers will be put together along with main highlights of the meeting and published after the meeting.

XI. Provisional Budget and Source of Funding(in US Dollars)

	CFC	Counterpart Contribution	
		ISAAA	NIBGE
Travel/accommodation CFC-supported participants from			
Asia (travel: 18 x US$ 666)	12,000		
Africa (travel: 18 x US$ 2,000)	36,000		
DSA (18+18) x 4 nights x US$ 180*	25,920		
Local participants			10,000
Speakers/resource persons	14,000		4,000
Conference materials/final publication	5,570	4,000	
Venue/host arrangements	10,000	3,000	4,000
ISAAA/NIBGE organisation/participation	4,000	10,000	5,000
ICAC organisation/coordination	3,500		
CFC/ICAC participation	9,000		
Total	**120,000**	**17,000**	**23,000**

* Based on a provision for costs of accommodation in Faisalabad and also covering all other miscellaneous travel and other expenses.

A more detailed operational budget will be prepared during the first month of project operation.

XII. Proposed Program

Note: the detailed programme will be developed close to the consultation..

REGIONAL CONSULTATION ON BIOTECH COTTON FOR RISK ASSESSMENT AND OPPORTUNITIES FOR SMALL SCALE COTTON GROWERS

March 6-8, 2007

National Institute for Biotechnology and Genetic Engineering (NIBGE)
Faisalabad, Pakistan

Implementing Agencies:

- *National Institute for Biotechnology and Genetic Engineering (NIBGE)*
- *International Cotton Advisory Committee (ICAC)*
- *International Service for the Acquisition of Agri-biotech Applications (ISAAA)*

Funding Agency

- *Common Fund for Commodities (CFC)*

5 March 2007: Arrival of Participants

5 March, Monday

TIME	ACTIVITY
1800	Welcome reception

Day 1
6 March, Tuesday

TIME	ACTIVITY	SUGGESTED RESOURCE PERSON
0800	Registration	
0830	Opening Program	
	Welcome remarks from NIBGE, CFC, ICAC, and ISAAA	**Dr.Yusuf Zafar** Director, NIBGE
		Mr. Sietse van der Werff Common Fund for Commodities
		Dr. M. Rafiq Chaudhry International Cotton Advisory Committee
		Dr. Randy A. Hautea Global Coordinator, ISAAA
	Message	**Govt. of Pakistan Official**
0930	Global status of commercialized biotech cotton	**Dr. Randy A. Hautea** Global Coordinator and Director,

		*SEA*Center ISAAA
1000	A decade of experience with biotech cotton	**Dr. M. Rafiq Chaudhry,** Head Technical Information Section of the ICAC
1030	Group Picture and tea break	
1100	Biosafety regulation - A country model that is practical, responsible, and effective- Learning from the experience of others	
1130	Intellectual Property Rights - Challenges and opportunities for sustainable agricultural development-	FAO, Rome, Italy
1200	Biotechnology: A look into the future	Dr. Marc Giband, CIRAD, France
1230	Commercial production of biotech cotton – Issues and challenges	
1300	Lunch Break	
1400	Biotech cotton, trade, socio-economic and market acceptance issues	
1430	Concerns, risks and issues of Bt cotton	
1500	Tea Break	
1530	Concerns, risks and issues re: adoption of Bt cotton – focus on management of insect resistance and secondary pests	
1600-1700	Do we really need biotech cotton?	
1900	Dinner hosted by NIBGE	

Day 2

7 March, Wednesday

DATE AND TIME	ACTIVITY	RESOURCE PERSON
0800 – 1530	**Case studies from the developing and developed countries in Asia-Pacific**	
0800	Lessons learnt from adoption of Bt Cotton in China (Mainland)	**Dr. Jingyuan Xia** Director General National Agro-Tech Extension and Service Centre (NATESC), Ministry of Agriculture, China (Mainland)
0830	Bt Cotton adoption in India	**Dr C.D. Mayee** Co-Chair, GEAC, India Or **Dr. K. B. Khadi** Director

		Central Institute of Cotton Research, India
0900	Experience with Bt cotton in Colombia	**Dr. Jorge Cadena** CORPOICA, Colombia
0930	Grower's view on biotech cotton	**A small grower to be identified from South Africa**
1000	Tea Break	
1030	Pakistan - Current status and future prospects for adoption of biotech cotton	**Dr. Yusuf Zafar** Director, NIBGE
1100	Grower's view on biotech cotton in Pakistan	**Mr. Mumtaz M. Khan Manais** Cotton grower, Vehai, Pakistan
1130	Biotech cotton and challenges for Africa	**Dr. Osama Mumtaz** ARC, Egypt
1200	To be identified	A speaker to be identified
1230	Open Forum and discussion	
1300	Lunch	
1400-1700	**Workshop**	
1400	From A to Z - The major challenges and lessons learned from experience- Discussion led by facilitator	
1500	Putting principles into practice	
1530	Coffee break	
1600	Concluding discussion and way forward	
1700	Workshop synthesis	
1900	Dinner	

Day 3
8 March 2007, Thursday: Visit to NIBGE labs, a textile mill/garment factory and Departure of Participants

Participants will be able to leave Faisalabad and depart to their countries in the afternoon

XIII. List of participants

Total number of participants will be close to one hundred. Participants can be divided into following categories.

1. Asia – The countries to be represented include Bangladesh, China (Mainland), India, Iran, Iraq, Indonesia, Kazakhstan, DR Korea, Pakistan, Philippines, Syria, Tajikistan, Thailand, Turkey, Turkmenistan, Uzbekistan and Vietnam.
2. Anglophone Africa – Egypt, Ethiopia, Ghana, Kenya, Mozambique, Nigeria, South Africa, Sudan, Tanzania, Uganda, Zambia and Zimbabwe
3. Invited speakers – There will be 5-6 invited speaker from various countries. This will include speakers from private companies who will be attending on their own expenses.
4. Local participants – There will be about 40-50 local participants from the federal government and provincial institutions working on cotton in the Punjab, Sindh and NWFP provinces. Progressive growers will also invited to attend the meeting in addition to some private companies dealing with cotton research and input supplies.

5. International institutions – CFC, ICAC, FAO, European Consortium for Agricultural Research in the Tropics (ECART) and International Service for the Acquisition of Agri-Biotech Applications (ISAAA)

XIV. References

1) James, C. *Global Status of Commercialized Biotech/GM Crops:* 2005. ISAAA: Ithaca, NY.

2) Graham Brookes and Peter Barfoot (2005). *GM Crops: The Global Economic and Environmental Impact - The First Nine Years 1996-2004*. AgBioForum Vol 8, Number 2 & 3, Article 15

3) Technical Information Section. 2005. Concerns, Apprehensions and Risks of Biotech Cotton. THE ICAC RECORDER, Volume XXIII, No. 1. 2005.

4) Pakistan: http://www.pakissan.com/english/allabout/crop/cotton/index.shtml

XV Project Implementation Schedule (1 November 2006 – 30 June 2007)

Regional Consultation on the Genetically Modified Cotton for Risk Assessment and Opportunities for Small-Scale Growers

Activity/Month	1	2	3	4	5	6	7	8
1. Planning workshop with partners								
2. Finalize Program								
Implementation schedule								
3. Workshop webpage development and maintenance								
4. Confirm invited speakers								
5. Confirm logistical arrangements								
6. Confirm participants								
7. Prepare documentation and workshop kit								
Fact sheet about Bt cotton								
Global status of Bt Cotton								
Booklet of abstracts of presentations/Powerpoint files of presentation								
8. Regional Consultation on Biotech Cotton								
9. Preparation and publication of the meeting's proceedings								
10. Assessment of impact/media monitoring								