

# **Debt Relief for Science and Technology**

**Proposal and guidelines for stakeholders**

**Prepared for UNESCO by Wady Haddad and Lawrence Wolff**

UNESCO, Paris 2001

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## Preface

Science and technology are widely recognized as being essential to the social and economic development of all nations. The belief that developing countries should only produce primary goods or low technology goods is today a thing of the past. The participants in the World Conference on Science (Budapest, June 1999) agreed that developing countries should build on their own educational systems and scientific expertise to serve their particular social priorities. Help from rich countries should therefore not consist in transfer of technology, as agreed at the United Nations Conference on Science and Technology for Development (Vienna, 1979), but should aim to set up local capacity building and scientific expertise. This is valid in particular for the smallest and poorest countries, where scientists and engineers are needed also to identify and adapt foreign technology to local needs.

A consensus was reached at the World Conference on Science that all sectors of society, and not just scientists and engineers, should have a say on national priorities in S&T. By the same token, all sectors of society should have an understanding of the role of S&T and its importance for social and economic development.

In Budapest, the Minister for Scientific Research and Technology of Senegal and the representative of Mali, and later the Minister for Scientific and Technical Research of Cameroon, advocated the use of financial resources freed by the reduction of the debt burden on the poorest developing countries to finance S&T. UNESCO is ready to support these countries in such an undertaking. For this purpose, and as a first step, the Science Sector of UNESCO commissioned a study on the feasibility of the proposal. The results of this study are contained in the present document, which examines the initiative in detail and explores ways of implementing it. Through its Division of Science Policy Analysis, UNESCO is ready to co-operate with the countries concerned, by assisting the decision makers and staff of ministries responsible for S&T in the process outlined in this document.

*Paris, 22 March 2000*



Maurizio Iaccarino  
Assistant Director-General  
for Natural Sciences, UNESCO  
Secretary-General,  
World Conference on Science

## **FREQUENTLY USED ACRONYMS**

HIPC	Heavily Indebted Poor Countries
IMF	International Monetary Fund
NGO	Non Governmental Organization
NPV	Net Present Value (of debt burden)
PRSP	Poverty Reduction Strategy Paper
R&D	Research and Development
S&T	Science and Technology

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# INTRODUCTION

The World Conference on Science (WCS), organized by UNESCO in co-operation with the International Council for Science (ICSU) and held in Budapest, Hungary, from 26 June to 1 July, 1999, underscored the contributions of scientific knowledge to humankind:

Life expectancy has increased strikingly, and cures have been discovered for many diseases. Agricultural output has risen significantly in many parts of the world to meet growing population needs. Technological developments and the use of new energy sources have created the opportunity to free humankind from arduous labour. They have also enabled the generation of an expanding and complex range of industrial products and processes. Technologies based on new methods of communication, information handling and computation have brought unprecedented opportunities and challenges for the scientific endeavour as well as for society at large.

*WCS, Declaration on Science and the Use of Scientific Knowledge, para 2*

Conference participants, however, bemoaned the fact that

As scientific knowledge has become a crucial factor in the production of wealth, so its distribution has become more inequitable. What distinguishes the poor (be it people or countries) from the rich is not only that they have fewer assets, but also that they are largely excluded from the creation and the benefits of scientific knowledge.

*WCS, Declaration on Science, para 5*

Part of the problem is that poor countries have not been able to invest sufficiently in scientific and technological research and development (R&D) nor in the human and physical infrastructure for science and technology (S&T). In many of these countries investments in R&D is as little as 0.01 per cent of GNP (see Table 3) while industrialized countries, invest up to 2 per cent and beyond of an already much larger GNP. This lack of investment may reflect a strategic choice, but in many instances the major constraint is the scarcity of financial resources. In addressing this issue, the WCS proposed that

Innovative and cost-effective mechanisms for funding science and pooling the S&T resources and efforts of different nations should be examined with a view to their implementation by relevant institutions at the regional and international levels.

*WCS, Science Agenda, para 27*

The financial situation of poor countries has been further complicated by heavy debt burden, which resulted in significant debt service payments. This in turn left these countries with little to invest for economic growth, for social advancement and for S&T development. Recently, the international community realized that poor countries are not going to be able to grow themselves out of debt. A new initiative for drastic and real debt relief was introduced in 1996 that will free funds to be invested in domestic programmes.

This paper examines this initiative and explores ways by which science and technology may benefit from debt relief efforts in the context of the poorest countries in the world. It begins with an overview of current thinking about economic development and the recent initiative led by the World Bank and the IMF but subscribed to by bilateral donors, the private sector and many NGOs. The paper then makes the case that science and technology ought to be a fundamental part of debt relief to the poorest countries, in light of the role of science and technology in the development process and in poverty reduction. Finally, it provides guidelines for stakeholders in science and technology development to benefit from debt relief efforts.

# OVERVIEW OF THE DEBT SITUATION

## Debt and economic development

When the initial debt crisis broke in the early 1980s, many official creditors took a view that debtors were facing a temporary liquidity problem. This was often the case in the middle-income countries in the 1980's and appears also to have been the case with the East Asian debt crisis of 1998–1999. A combination of strong domestic reform programmes, commercial debt relief, and support from international financial institutions has improved the situation of middle-income debtor countries. In fact, the debt crisis no longer threatens the international financial system.

In the 1980s it was thought that the heavily indebted poor countries (HIPCs) also faced a similar problem and the approach was to continue financial flows to these countries and provide short-term non-concessional debt relief. The objective was basically to maintain net positive financial flow into the country. Eventually export-led growth and anticipated improvements in terms of trade would help the countries to grow out of debt. However, no such transformation has been in sight for most of the HIPCs.

At the same time a new approach to economic development has been taking hold. The philosophical and economic underpinnings of this new approach were recently expressed in a speech by Michel Camdessus, Director of the IMF at the time:

First, a progressive humanization of basic economic concepts. It is recognized that the market can have major failures, that growth alone is not enough, or can even be destructive of the natural environment or precious social goods and cultural values. Only the pursuit of high-quality growth is worth the effort. What is such growth? It is: growth that can be sustained over time without causing domestic and external financial imbalance; growth that has the human person at its center, that is accompanied by adequate investment, particularly in education and health, to take full advantage of the tremendous leverage of human capital for future growth; growth that, to be sustainable, is based on a continuous effort for more equity, poverty alleviation, and empowerment of poor people; and growth that promotes protection of the environment, and respect for national cultural values. This is what our programmes are, more and more, and must aim for. Second, at a deeper level, we observe also in recent approaches a striking and promising recognition of the convergence between a respect for fundamental



ethical values and the search for efficiency required by market competition. This augurs well for attaining the highest quality growth we now seek. Yes, we are seeing a far wider recognition . . . that there is a mutually reinforcing relationship between macroeconomic stability and structural reform on one hand, and growth and the reduction of poverty and inequality on the other.

. . . In short, a new economic paradigm is emerging. The new opportunities for growth created by the revolution in information technology, combined with more resolute efforts to promote opportunities for all to share in the benefits of growth, will amplify the positive effects of macroeconomic and monetary stability. The emerging new paradigm, rooted in fundamental human values, taken together with a better ability to prevent and manage crises, is a distinct and positive feature of our times.

*(Address to the Tenth United Nations Conference  
on Trade and Development, Bangkok, Thailand,  
13 February, 2000)*

## **Traditional debt relief**

Traditionally, when countries were unable to pay their debts, either commercial, bilateral, or multilateral, short-term assistance would be provided and governments were helped to take steps to reduce imports and increase exports, provide more flexible exchange rates, and reduce public sector deficits, often through reduced public spending. The aim was to encourage investors back to the country through reduced barriers to investments. The IMF and the World Bank usually took the lead, along with the regional development banks. The objective often was to increase net financial flows rather than to reduce debt.

### ***The Paris Club***

With regard to bilateral debt, countries have had recourse to the 'Paris Club', a forum bringing debtors and their official creditors together in a unified negotiating framework, with a permanent secretariat supported by the French Treasury. Traditionally, temporary relief has been provided to countries in imminent danger of defaulting by 'rescheduling' 12–18 month slices of officially guaranteed export credits and intergovernmental loans. This would mean stretching out repayment terms and often lowering interest rates. Paris Club rescheduling agreements are linked to the adoption of IMF programmes by the debtor government for the period in which the rescheduled debts would have fallen due. Subsequently the debtor country negotiates with each creditor

country based on the Paris Club terms. In 1994 the Paris Club agreed to introduce the so-called 'Naples Terms' for the poorest countries, whereby these countries may be allowed up to 67 per cent debt reduction compared with the former 50 per cent. The condition for qualifying for these terms is that the country has a per capita income of less than US\$500 and total debt to annual export ratio of more than 350 per cent.

### ***The Brady Plan***

This mechanism has also been available to countries, that have commercial debt, often to private banks. It evolved in the early 1980's when the Mexican government was no longer able to fulfill its external debt commitments, mainly to several hundred commercial banks. Brady bonds were created as an exchange for defaulted loans owed by a debtor nation. They combine the repurchase of some of the defaulted loan stock by the debtor nation with an exchange for the remainder of the defaulted debt for Brady bonds, and are undertaken in conjunction with the IMF who must approve the economic progress that the debtor nation is making. Brady bonds allow the investor to invest in sovereign debt of a country without incurring the currency risk of local instrument.

### ***Debt swaps***

While these have never amounted to a very large portion of debt relief, 'debt swaps' are also possible. A debt swap is defined as the cancellation of external debt in exchange for the debtor government's commitment to mobilize domestic resources (local currency or another asset) for an agreed purpose. The economic rationale for debt swaps is based on the willingness of creditors to accept less than face value for debts and for the debtor government to make payment at a higher price in exchange for cancellation of the debt. The difference between the purchase price for debt and its redemption price in local currency is the gain from debt conversion, which can be invested in the environment or the social sectors.

In a bilateral swap, a creditor government cancels debt owed by a debtor government in exchange for the debtor setting aside an agreed amount of counterpart funds in local currency for the environment. In a three-party model, an organization (e.g. an NGO) solicits debt donations or purchased debt at a discount and negotiates separately with the debtor government for cancellation of the debt in exchange for project funding for conservation. The feasibility of implementing these swaps depends on a creditor willing to donate or sell debt at a discount from face value and the debtor interested in and able to

provide local currency or another commitment in support of the environment. Creditor governments may be interested because they recognize the positive development impact of the swap. Commercial creditors are motivated primarily by the desire to recover some portion of a debt that they perceive as unlikely to be paid back. Debtor governments are interested so long as the benefits of debt swaps are perceived of as more advantageous than future debt relief that may be obtained through debt rescheduling agreements.

The 'debt for environment or nature' swap has played a fairly important role in ensuring environmental protection. The first debt for nature swap was concluded in 1987 between the Government of Bolivia and an environmental NGO, resulting in the designation of a biosphere reserve and small endowment for its operating costs. Debt for nature and environment, and in some cases, social programmes, has generated over US\$1 billion in funding for the environment and other purposes.

## **New approaches to debt relief: the HIPC initiative**

In the early 1990s it began to be clear that the HIPCs were not going to grow themselves out of debt. On the contrary in the late 1980s and early 1990s exports declined further, aggravated by more terms of trade deterioration. Imports fell further, depressing capacity utilization and investment. The growing budgetary claims of interest payments, as well as the IMF's insistence on reduced budget deficits, forced governments to cut back on domestic spending. At the same time, the new understanding of economic and social development described above was emerging.

By 1996 the international community realized it had to rethink debt for these countries. After prodding by NGOs and bilaterals, the IMF and the World Bank finally recognized that the external debt situation for a number of low-income countries, mostly in Africa, had become extremely difficult. For these countries, even full use of traditional mechanisms of rescheduling and debt reduction – together with continued provision of concessional financing and pursuit of sound economic policies – would not be sufficient to attain sustainable external debt levels within a reasonable period of time and without additional external support. A new initiative for the 'Heavily Indebted Poor Countries' (the HIPC initiative) was formulated and received the full endorsement of the Boards of the two financial institutions. (In 1999 at the Cologne summit, the group of eight industrialized countries declared support for deeper debt relief within a framework of poverty reduction.) In fact, this initiative is now the only framework for debt relief for the HIPCs and would involve the participation of all creditors – bilateral, multilateral, and commercial.

In principle, the HIPC initiative enables the poorest, most heavily indebted countries to escape from unsustainable debt. It is designed to provide exceptional assistance to eligible countries following sound economic policies to help them reduce their external debt burden to sustainable levels – that is, to levels that would comfortably enable them to service their debt through export earnings, aid, and capital inflows. This assistance would entail a reduction in the net present value (NPV) of the future claims on the indebted country. Relief is based on a country's ability to pay within a total context of economic growth and poverty reduction. In all participating countries the burden of debt service will, on average, be cut by 50–60 per cent. Such assistance would help countries focus their energies on building the policy and institutional foundation for sustainable development and poverty reduction, and would provide the funds and incentives for domestic investment.

The initiative is a comprehensive, integrated and co-ordinated approach to debt reduction. Central to the initiative is the country's continued effort toward macroeconomic adjustment and structural and social policy reforms. In addition, the initiative focuses on ensuring additional finance for social sector programmes – primarily basic health and education. For the first time, the multi-lateral banks and institutions are willing to forgive a portion of their debt. The result is real savings to countries in debt servicing. These savings in foreign currencies would then be directed toward critical local social expenditures. Debt reduction would be additional to development assistance and will not replace it. A fundamental element of the initiative is the requirement that all creditors and debtors work together in a co-ordinated fashion both to reduce debt and to support development efforts.

The amount of debt relief would vary from country to country. For example, in Mozambique scheduled debt service will fall from US\$600 million per year (before debt relief) to US\$70 million per year (after debt relief). The cash savings will be smaller since Mozambique has not been servicing much of this debt. Nonetheless actual debt service payments will decline from 45 per cent of fiscal revenues to less than 10 per cent in 2005 and about 5 per cent in 2010, thereby freeing up budgetary resources for social spending.

The face value of the external debt stock is not a good measure of a country's debt burden if a significant part of the external debt is contracted on concessional terms with an interest rate below the prevailing market rate. The net present value (NPV) of debt is a better measure, since it takes into account the degree of concessionality. NPV is defined as the sum of all future debt-service obligations (interest and principal) on existing debt, discounted at the market interest rate. Whenever the interest rate on a loan is lower than the market rate, the resulting NPV of debt is smaller than its face value, with the difference reflecting the grant element.

## Who qualifies for the HIPC initiative?

In 1996, 41 developing countries were classified as being the heavily indebted poor countries, and therefore, in principle eligible for this initiative. This included 32 countries with a 1993 GNP per capita of US \$695 or less and 1993 present value of debt to exports higher than 220 per cent or present value of debt to GNP higher than 80 per cent. Also included were 9 countries that received, or were eligible for, concessional rescheduling from Paris Club creditors. Table 1 provides the list of eligible countries by region.

A country must satisfy a set of criteria to be eligible for special assistance for debt relief. Specifically, it must: be eligible for concessional assistance from the IMF and World Bank; and face an unsustainable debt burden, beyond available debt-relief mechanisms such as the Naples Terms (where low-income countries can receive a reduction of eligible external debt of up to 67 per cent). Then it must establish a track record of reform and sound policies through IMF – and World Bank – supported programmes.

## The process of the HIPC initiative

The HIPC framework involves two stages. The first stage is a three year period during which an HIPC country works in co-ordination with, and with the

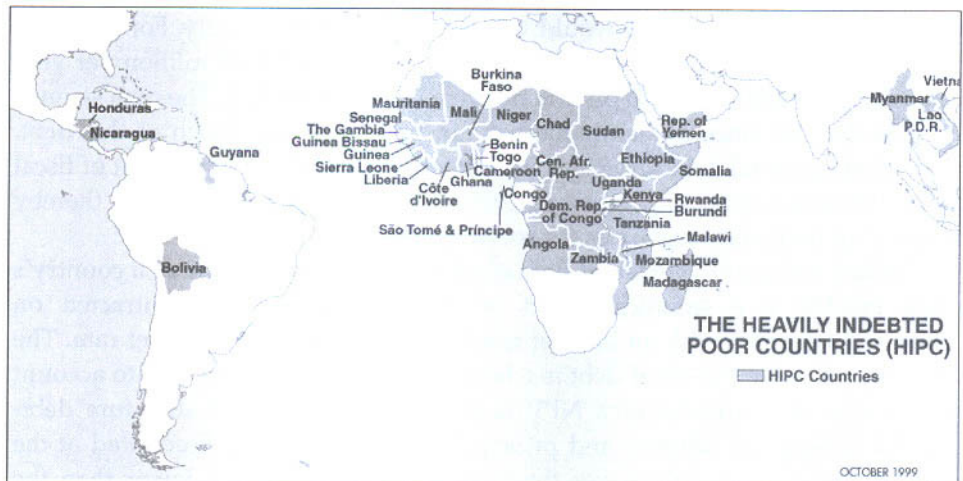


TABLE 1. The heavily indebted poor countries (HIPC)

<i>Africa (32 countries)</i>			
Angola	Congo, Dem. Rep.	Madagascar	Sao Tome and Principe
Benin	Côte d'Ivoire	Malawi	Senegal
Burkina Faso	Ethiopia	Mali	Somalia
Burundi	Ghana	Mauritania	Sudan
Cameroon	Guinea	Mozambique	Tanzania, United Rep. of
Central African Republic	Guinea-Bissau	Niger	Togo
Chad	Kenya	Rwanda	Uganda
Congo	Liberia	Sierra Leone	Zambia
<i>Latin America (4 countries)</i>			
Bolivia	Guyana	Honduras	Nicaragua
<i>Middle East (1 country)</i>			
Yemen			
<i>Asia (3 countries)</i>			
Lao, People's Dem. Rep.	Myanmar	Vietnam	

Source: World Bank.

support of the World Bank and the IMF to establish a record of good economic policies and sustained poverty reduction. Particular attention is paid to improving social programmes, especially in education and health. Some debt relief is provided. At the end of this three year period the international community determines whether a country's debt level is sustainable. For those countries whose debt burden remains unsustainable after full use of existing debt relief mechanisms, a full package of debt relief is identified. All creditors participate in providing exceptional assistance beyond current mechanisms to reach debt sustainability. This is known as the 'decision point'. The full package of debt relief will be provided at the end of a second period of good policy performance, lasting up to three years. This is known as the 'completion point'. Table 2 provides the status of the country cases as of mid-1999 under the initiative.

A consensus has developed that debt relief must be part of a comprehensive poverty reduction strategy comprised of policies aimed at improved social programmes, good government and widely shared economic growth. Countries will establish national poverty reduction strategies incorporated into a document, the Poverty Reduction Strategy Paper (PRSP). The World Bank will

TABLE 2. HIPC initiative: status of country cases (as of February 2000)

I. Original framework									
Country	Estimated total nominal debt service relief (US\$ millions)	Decision point	NPV debt/export target (in %)	Assistance at completion point (US\$ millions, present value at completion)					Percentage reduction in NPV of debt <sup>1</sup>
				TOTAL	Multilateral of which:		World Bank	IMF	
<i>Completion point reached under original framework</i>									
Uganda	650	Apr. 97	202	347	73	274	160	69	20
Bolivia	760	Sept. 97	225	448	157	291	54	29	13
Guyana	410	Dec. 97	107 <sup>2</sup>	256	91	165	27	35	24
Mozambique	3,700	Apr. 98	200	1,716	1,076	641	381	125	63
<i>Decision point reached and assistance committed by Bank and Fund under original framework</i>									
Burkina Faso	200	Sept. 97	205	115	21	94	44	10	14
Côte d'Ivoire	800	Mar. 98	141 <sup>2</sup>	345	163	182	91	23	6
Mali	250	Sept. 98	200	128	37	90	44	14	10
<i>Preliminary HIPC Document issued under original framework; preliminary assessments are subject to change</i>									
Guinea-Bissau <sup>3</sup>	600	2000	200	300	148	153	73	8	73
Ethiopia <sup>3</sup>	1,300	1999	200	636	225	411	214	21	23
Mauritania <sup>4</sup>	550	Jul. 99	200	271	114	157	43	21	25
<i>Debt judged sustainable under the original framework</i>									
Benin	...	Jul. 97	...	...	...	...	...	...	...
Senegal	...	Apr. 98	...	...	...	...	...	...	...

## Notes

1. In per cent of net present value of debt at completion point, after full use of traditional debt relief mechanisms.
2. Eligible under fiscal/openness criteria; NPV of debt to exports target chosen to meet NPV of debt-to-revenue target of 280 per cent.
3. Finalization of debt relief packages for Ethiopia and Guinea-Bissau has been put on hold due to armed conflicts.
4. Mauritania's formal decision point had been delayed in order to assess Mauritania under the enhanced framework.

support governments in the design of these programmes, and the IMF will ensure consistency between poverty programmes and macro-economic policies. Key elements will include the development of clear outcome indicators, monitorable intermediate measurements, transparency and broad participation of civil society. The completed PRSP is presented to the IMF and World Bank Boards and forms the basis of concessional assistance.

In order to ensure that all stakeholders accept the strategy embodied in the PRSP, the World Bank helps to analyse the poverty situation, especially in basic education and health and social assistance, including an identification of critical issues and inefficiencies, but does not propose specific policies. On the basis of this work, the country sets up a national team including government officials, unions, NGOs, political leaders, businessmen and community leaders, who work together intensively to absorb the analytical work and identify policy options. A

TABLE 2. (contd.)

Country	Estimated total nominal debt service relief (US\$ millions)	Decision point	NPV debt/ export target (in %)	Assistance at completion point (US\$ millions, present value at completion)					Percentage reduction in NPV of debt <sup>5</sup>
				TOTAL	Multilateral of which:			IMF	
				Bilateral	World Bank				
<i>Decision point reached and assistance committed by Bank and Fund under enhanced framework<sup>6</sup></i>									
Bolivia	1,285	Jan. 00	150	854	268	585	140	50	30
Mauritania	1,100	Jan. 00	137 <sup>7</sup>	622	261	361	100	47	50
Uganda	1,300	Jan. 00	150	656	110	546	357	91	38
<i>Preliminary HIPC Document issued; preliminary assessments are subject to change</i>									
Nicaragua	4,600	2000	150	2,507	1,416	1,091	161	28	66
Tanzania	5,000	2000	150	2,485	1,314	1,171	728	110	59
Honduras	1,100	2000	137 <sup>7</sup>	569	208	361	85	18	18
Guinea	1,200	2000	150	638	256	383	173	37	34
<b>Total HIPC Debt Relief<sup>6</sup></b>	<b>24,255</b>			<b>12,622</b>	<b>5,825</b>	<b>6,799</b>	<b>2,832</b>	<b>715</b>	
<b>(original and enhanced framework, including preliminary HIPC assessments)</b>									

## Notes

5. In per cent of net present value of debt at decision point, after full use of traditional debt relief mechanisms.
6. For Bolivia and Uganda, assistance under the enhanced framework is additional to assistance provided under the original framework.  
For Mauritania, the enhanced assistance replaces the assistance numbers estimated in the preliminary assessment under the original framework.
7. Eligible under fiscal/openness criteria; NPV of debt to exports target chosen to meet NPV of debt-to-revenue target of 250 per cent.

Source: IMF and World Bank board decisions, completion point documents, final HIPC documents, preliminary HIPC documents, and staff calculations.

national seminar and then a policy seminar are held and the results discussed and agreed upon with the Government. This consensus building effort forms the basis of the PRSP. In short, negotiations with regard to objectives and modalities take place within the country between Government and civil society rather than, as in the past, between Government and the lending agencies.

The Government and civil society agree on a 10-year programme of poverty reduction coupled with macro-economic reforms, which is reviewed every three years. To help achieve the development aims embodied in this document, the World Bank has established a new lending instrument entitled the Adaptive Programming Loan. The Bank's board approves the ten-year programme, while Bank management and the government adjust the targets and amounts of new lending every three years. All other multilateral and bilateral support efforts are defined within the context of the national ten-year initiative.



While a number of countries are in this process, Uganda is furthest advanced. The following box describes the current situation in Uganda.

### **The Uganda HIPC initiative**

Uganda reached its 'decision point' in 1997 and was granted interim debt relief. Additional debt relief was provided in the following years. As of late 1999 a total of US\$347 million in debt relief in net present value was distributed, equivalent to about US\$45 million in cash flow. Under the 'enhanced initiative', further debt relief was provided in early 2000. To be eligible for such relief, Uganda has pursued a detailed poverty reduction strategy and completed a PRSP. Uganda redefined poverty to include not only standard poverty indicators of income consumption, education levels and health, but also risk, vulnerability, isolation, powerlessness and insecurity. The government has established a 'Poverty action fund' (PAF) which has four features: fully integrated into the government's budget; 5 per cent of resources are allocated to improve accountability; programs are output oriented; and implementation and outcomes are reviewed quarterly by donors and representatives of civil society. One per cent of GDP was mobilized for the PAF in 1998-1999. Economic growth recently has been high, thus permitting significantly increased social expenditures in real amounts as well as a percentage of GDP. The government has implemented a decentralization programme as well as a wide range of reforms to improve governance, transparency and accountability. It has established sectoral policy programmes in education, health, water, agriculture and roads, with the highest priority a strong commitment to basic education.

The future reform agenda places high priority on developing a suitable environment that is conducive to private sector development by working on effective delivery of public services, financial and physical infrastructure, and public utilities, especially power. The government will continue with strengthening privatization, trade liberalisation, tax administration, governance, transparency and accountability. PAF funds will focus more on outcomes and on results on the ground. The government is developing sector wide approaches (SWAPs) in the key social sectors, especially related to primary and subsequently secondary education, primary health care, rural water and sanitation, agricultural extension and research and rural roads.

## **Enhanced HIPC initiative**

The 1996 World Bank/IMF initiative was criticized by a number of governments and NGOs, the main concerns being related to the pace of implementation, the depth of debt relief and expanding eligibility terms. Some NGOs argued for the complete elimination of all debt for HIPCs. Other proposals included a 'human development approach', defining needs for sustainable development expenditures with debt service as a residual category.

In response to these questions, and after a wide consultation, in late 1999 the World Bank and IMF revised the programme to establish the 'Enhanced' HIPC initiative. The new programme deepens and broadens the initiative by revisiting the criteria by which a country's external debt is determined as being sustainable. The desired net present value of debt to exports will be lowered from the current range of 200–250 per cent to a fixed level of 150 per cent, thereby increasing the amount of debt relief to each country as well as the number of eligible countries. The cost of the current initiative will more than double, from roughly US\$12.5 billion in present value terms to more than US\$27 billion, divided in half between bilateral and multilateral creditors.

# **SHOULD SCIENCE AND TECHNOLOGY QUALIFY TO BENEFIT FROM DEBT RELIEF?**

## **The current approach: little or no attention to science and technology**

The current approach to debt relief for the HIPC's takes into account only a few elements, which contribute to the development of science and technology, but without an overall strategic view. For example, a broad base of people able to read and write, as well as a stable macro-environment, where private innovation and investment is encouraged, are fundamental in the long term to technological development. But the HIPC initiative does not take a systems approach to science and technology. It does not examine the quality, relevance, and adequacy of high-level training programmes, applied scientific and technological research, and knowledge linkages with the rest of the world. At most, a few of the strategies mention the need for agricultural research. In the Uganda documentation, mention is made of ensuring continuity and quality of agricultural research, including stable funding for the National Agricultural Research Organization (NARO). This institution would focus on developing high-yield disease – and pest – resistant seeds as well as development and demonstration of appropriate technologies, soil preservation and livestock disease prevention.

There are several reasons for the lack of attention to science and technology in debt relief programmes. In the first place, the 41 countries eligible for debt relief are among the poorest in the world, with the lowest indices of provision of basic education and health services, water and sanitation. Therefore the dialogue with countries focuses on the intertwining of two critical elements, macro-economic reform and poverty alleviation. Secondly in a number of these countries higher education has received a disproportionate share of government revenue and higher education students are often considered a privileged and powerful lobby. To the extent that science and technology is linked with university education, the reform objective is often to reduce costs and increase efficiency of higher education rather than develop research capacity. Except for a few agricultural research institutions, the countries are almost devoid of capacity in this area and the history of research, also except for agriculture, is one of lack of local application. Finally, there may be a lack of awareness by government leaders as well as international experts regarding the central importance of science and technology, even in the poorest countries.

## The status of science and technology in the developing world, including the HIPCs

The gap between the developed and developing world in S&T is enormous and growing. On a per capita basis, developed countries have nearly ten times as many research and development scientists and technicians as developing countries (3.8 versus 0.4 per 1000). Developed countries on average spend 2 per cent of GDP on scientific R&D, compared to an average of 0.5 per cent in developing countries. Developed countries account for more than 97 of all new patents registered in the United States of America and Europe. Physical resources for the training of scientists and engineers, as well as linkages both physical and virtual, are inadequate. The institutional situation in many countries is such that qualified scientists and engineers are likely to leave their native country. At the same time the environment for innovation is often detrimental to linkages between science, technology, and the productive sector.

The situation in the world's poorest countries is even more acute. Table 3 shows the percentage of GNP invested in scientific R&D in the HIPCs. Many of these countries do not have data to report. In some of the countries where data are available, investment in R&D is as little as 0.01 per cent of GNP. Enterprises, large or small, have no R&D capacity nor a policy to purchase it. The small farmers and artisans, who still comprise the majority of the labour force in the poorest countries, have little access to appropriate technology. Regulatory frameworks, intellectual property rights organizations, and information and technical services are weak or non-existent, and university-based research, where it occurs, is divorced from country conditions and needs. In fact, many research efforts take place in areas where it can neither be linked with existing technological capacity nor be directly socially useful. The only exception is that of few agricultural research institutions and externally funded health research institutions, some of them regional. Co-ordination of agents, institutions, and policies is weak or non-existent, a result of lack of information on elements as diverse as international prices and sources of technical assistance as well as poor capacity to process information.

## Why science and technology is essential for the HIPCs

Technological progress drives economic growth and development, creates jobs, contributes to higher agricultural yields, improves human health, and makes possible the production of higher quality consumer goods and services at lower prices. Economic globalization and the world revolution in telecommunications and information technologies have increased the pace and importance of

**TABLE 3. Expenditure for scientific R&D as percentage of Gross National Product (GNP)**

Country	Year of data	% of GNP	Country	Year of data	% of GNP
<b>Africa</b>					
Angola	-	-	Madagascar	1985	0.18
Benin	-	-	Malawi	-	-
Burkina Faso	1997	0.13	Mali	-	-
Burundi	1989	0.31	Mauritania	-	-
Cameroon	-	-	Mozambique	-	-
Central African Rep.	1984	0.25	Niger	1987	0.09
Chad	-	-	Rwanda	1995	0.04 <sup>1</sup>
Congo	1984	0.01	Sao Tome and Principe	-	-
Congo, Dem. Rep	-	-	Sierra Leone	-	-
Côte d'Ivoire	-	-	Senegal	1997	0.01
Ethiopia	-	-	Somalia	-	-
Ghana	-	-	Sudan	-	-
Guinea	-	-	Tanzania, United. Rep. of	-	-
Guinea-Bissau	-	-	Togo	1994	0.48
Kenya	-	-	Uganda	1996	0.57
Liberia	-	-	Zambia	-	-
<b>Latin America</b>					
Bolivia	-	-	Honduras	-	-
Guyana	1982	0.23	Nicaragua	-	-
<b>Asia</b>					
Lao, People's Dem. Rep.	-	-	Vietnam	-	-
Myanmar	-	-			
<b>Middle East</b>					
Yemen					

1. Data refer to University of Rwanda only.

Source: UNESCO, 1999, *Statistical Yearbook*.

technological innovation and are transforming the world at an astonishing rate. Failure to keep up with technological innovation jeopardizes a nation's competitive position in international markets. Judicious investments in science and technology can have a substantial payoff in increased productivity, wages and living standards.

While all this is true, does it also apply to the poorest countries? Given their overwhelming poverty, should not the poorest put off strengthening science

and technology, focus on poverty reduction, and simply purchase the necessary technology from abroad?

This argument is false. Science and technology is as critical for poverty reduction as basic health and education, governance, and macro-economic stability:

- Poor countries are in critical need for scientific knowledge and technological know-how to generate local solutions to their pressing problems in the areas of public health, water purification, sanitation, nutrition, food and water supply, energy, communication, etc.
- S&T is the necessary input for economic development, which will raise up the standards of living for all and make countries less poor. Development cannot be sequential, starting with basic education and health, and later concentrating on higher education, but must be simultaneous.
- S&T can help the traditional sectors to identify appropriate technologies to improve productivity and help in the transition from the traditional to the modern sector.
- S&T helps poor countries to come out of isolation and marginalization, and empowers them with knowledge and tools to actively participate in and benefit from the technologically sophisticated global economy.
- Technology can also help countries to leapfrog directly to more sophisticated technology, as in the case of cellular telephones, and in the near future, the Internet, using the air waves rather than hard wiring.

In short, the poorest countries cannot rely forever for development on producing primary goods or low quality manufactured goods characterized by low productivity and low wages. Every country has its own physical and human resource endowments that need to be studied and strengthened so that they can be re-structured to compete on world markets. Similarly every country has its own peculiar set of impediments to development, ranging from desertification to AIDS to malnutrition, which require specialized knowledge and understanding to resolve them. Finally a critical mass of scientists and engineers is needed at the least to identify and then adapt foreign technology to local needs.

### ***Should S&T be financed by public funds?***

The economic justification for a government role in science and technology is compelling. Public goods often merit government financing because the lack of incentives for private funding would otherwise lead to under-investments in technologies from which society as a whole can expect to benefit. Most fundamental research, as well as research related to public goods such as public health, education, and environment, falls into this category. Government

investment in training teachers, scientists and engineers provides support for imparting basic scientific knowledge to the population as a whole. Research conducted in universities and technical institutes helps train creative professionals in all fields who can then identify and adapt new technologies, as well as pass that knowledge on to others.

Public expenditure for industrial R&D can be considered as a partial public good. Path-breaking innovations, such as those associated with solid-state electronics or the Internet, affect large portions of the economy and can establish a new growth trajectory, but they require lengthy time horizons and present high uncertainty in outcomes and impacts. Support for the Internet in poor countries, for example, is fundamental to keep up with technological change. Generic technologies are more incremental, with benefits that are widely applicable and thus hard to protect. Examples of this are improved construction and manufacturing processes, as well as awareness of international requirements for product quality. The small enterprises in the poorest countries have neither the human nor the financial resources to identify these technologies.

In short, a strong public role is justified not only in scientific research and in pre-commercial R&D, but also in directly encouraging technological innovation. The case for public provision is less compelling, since in many cases private institutions with a variety of public subsidies can provide the service more efficiently than the public sector. Furthermore, whatever the policies and programmes, they need to be consistent and remain in place for a long period of time. The life cycle of R&D is long, requiring continuity year after year. Frequent changes in policies (explicit or implied) tend to destroy the chances of obtaining results that reach society and the economy.

## **What science and technology is essential**

Countries should adopt best practices for advancing innovation, in a manner best suited to their needs and resources. Innovation is no longer a linear process arising from a single advance in science; it requires a systems approach involving partnerships, linkages between many areas of knowledge and constant feedback between many players. Possible initiatives include co-operative research centres and research networks, technology 'incubators' and research parks, and transfer and advisory bodies for small and medium enterprises. Specific policy instruments, including initiatives to encourage national innovation systems to address science-technology links, should be developed taking into account global economic and technological changes. Science policy should promote the incorporation of knowledge into social and productive activities. It is imperative

to tackle the issue of the endogenous generation of technologies starting from problems faced by developing countries. This implies that these countries should have resources available to become generators of technologies.

WCS, *Science Agenda*, para 38

For S&T to be essential for HIPCs, it requires a systematic approach reflected in the concept of 'national innovation systems', defined as 'a network of institutions in the public and private sectors whose activities and actions initiate, import, modify and diffuse new technologies' (OECD). This approach takes into account the fact that technological progress generates and results from innovations, broadly defined as the processes by which firms, and institutions, as well as self-employed farmers and artisans, master and put into practice product designs and processes which are new to them. The new emphasis is on the enabling environment which fosters innovation and technical change and the linkages between all the actors involved in innovation. The approach breaks down the difference between the idea of producers (public and university scientific research creating knowledge) and consumers of knowledge (firms and productive sector users/buyers of technology), and emphasizes instead the relationships between all the components in a complex system not controlled from above but consisting of loosely articulated parts interacting frequently and productively with each other. On this basis national innovation systems include:

- macroeconomic conditions and regulatory frameworks that provide the environment for innovation in the private sector;
- national systems that manage and co-ordinate S&T institutions;
- communications and information technology;
- the capacity to monitor and assess relevant information;
- mechanisms for linking academic institutions with society;
- scientific and technological services and mechanisms to promote and facilitate the spread and transfer of technology, such as metrology, norms and standards, information services and technological consulting;
- operating conditions and procedures;
- R&D capacity to generate knowledge and techniques;
- programmes to educate and train personnel;
- the scientific and technological know-how of the labor force; and
- financial intermediaries and resources.

At the most fundamental level, science explores nature and educates human society to understand it. It includes not only the natural sciences, but also the social sciences – economics, sociology, and psychology – as well as multidisciplinary studies in areas as disparate as the environment and education. Good scientific training also forms the basis for preparing the



human resources needed to understand and adapt technology. But good science does not necessarily turn into market innovation. One of the main goals of public policy in science, therefore, should be to encourage more linkages with technology.

The core activity of technology is the creation of purposeful goods and services. Technology is broader than science, especially in its tacit dimensions. To a certain degree, the activities of technological enterprise remains an art and a craft, drawing on science and depending on it, but also (and not infrequently), going beyond hard scientific understanding. Nonetheless, in the new economic environment, with a rapidly expanding knowledge base and increased speed of applications, the institutional divide between technology and science is eroding, as science is increasingly used to create new products (e.g. pharmaceuticals) and as technological change is influencing priorities and approaches in science.

Of particular importance is investment in knowledge transmission and generation – building human capital. The basic skills learned in primary and secondary schools must be complemented by training of mid-level technical workers with skills in areas such as electronics and computing as well as in management areas such as quality control, information management, inventory management, cost accounting. While it is important to strengthen general education and skill training, providing opportunities for acquiring advanced knowledge and skills must be pursued concurrently in order to advance development of the economy, manage innovation, and harness new technologies. Technological capacity – the ability to assess, select, adapt, use and develop new technologies – is becoming a critical determinant of a country's competitiveness prospects. At the same time, scientific research is basic to the generation and transmission of new knowledge, as well as to the training of creative technology manpower.

A stable environment with long-term plans and funding, as well as a focus on institutional development, is required because the returns from S&T accrue over the long term, i.e. through compounded growth in productivity. It takes a long time to create R&D groups and little time to destroy them. High-level research institutions, as well as the private sector, cannot afford 'stop and go' projects and delayed payments due to erratic public funding. Countries unable to insulate their S&T institutions from oscillations, crises, political uncertainties and erratic budgets run the risk of paying the front-end costs of S&T without reaping lasting benefits. In this respect it is important to focus on the sustainability and delivery capacity of institutions.

Another requirement is to take a regional and international perspective. Science and technology have no country and know no regional boundaries. Especially the smaller, poorer countries with limited resources will need to

encourage the acquisition of S&T knowledge to be applied for the selection and adaptation of appropriate technology as well as to share and disseminate regional successes and lessons learned.

# **GUIDELINES FOR INCORPORATING S&T INTO DEBT RELIEF PROCESS**

## **Understand the process**

Since the HIPC initiative is the most comprehensive and only mechanism for debt relief for the heavily indebted poor countries, the first step for S&T to benefit from the resources generated from this process, is to understand the process well enough to participate in it effectively and in a timely manner. The process was described in section 'Overview of the debt situation' of this paper, and is presented schematically in the flow chart on the next page.

## **Develop a constituency and advocacy strategy**

Two facts are important to realize at the outset: (a) the S&T sector will have to compete with other equally legitimate sectors for the resources generated by the debt relief initiative; and (b) the bargaining for distribution of resources is an in-country process. It is, therefore, essential to develop a constituency within the country for S&T and formulate an advocacy strategy for the role of S&T in economic growth and poverty reduction.

The small number of scientists, researchers, and intellectuals in the poorest countries need to take the lead in bringing discussion of S&T into the mindset of the countries' political, financial, and business and community leaders – as well as the economists, financial analysts, and sectoral specialists from the multilateral agencies working on these countries.

Their first step will be to determine whether their countries are eligible for debt relief. Typically the Ministry of Finance and/or Central Bank will be the key ministry involved in debt relief. This small group will need to understand the current stage of the debt relief process. Whatever the stage of debt relief, the S&T group will need to raise awareness among the decision makers involved in debt relief with regard to potential benefits of including S&T in Poverty Reduction Strategies and in identifying uses for public funds released by debt relief. The S&T constituency should utilize the arguments mentioned in the previous chapter to emphasize the centrality of science and technology for development, even in the poorest countries, as well as the critical importance of public policy and investment.

The S&T group will need to understand the sources of suspicion by many in

**SCHEMATIC CHART: Process of debt relief for S&T**

**1. Qualifying stage**

- Preliminary document by country



- Review by Bank and IMF



Qualifying for initiative

**2. Decision stage**



- Sector study – Analysis only
- Formation of national teams (S&T, finance, stakeholders, etc.)



- Identification of policy options



- National seminar (technical and societal)



- Political seminar (national policy and strategy)



- Formulation of guidelines for use of debt relief funds for R&T



Poverty reduction strategy paper  
(PRSP)



Approval by boards of World Bank

1/3  
of funds

**3. Completion point ( 2–3 years later)**

Review and adjustment

2/3  
of funds

**4. Implementation perspective: another 7–8 years**

both local and international communities that they could be lobbyists for an elite group with an inadequate understanding of critical development needs, and they need to act to overcome this perception. One critical point is to accept the fundamental importance of increased financing of basic education and health services, to recognize that higher education as such should not be a privileged sector, and to support efforts to rationalize and make more efficient higher education. Only by accepting these premises can the S&T constituency argue for the fundamental importance of knowledge formation and generation and the criticality of a public role.

## **Plug into the process**

In addition to understanding the process, S&T decision makers must find out at what stage the discussions on debt relief is, including what issues are under consideration. If the government is at the beginning of the HIPC process, then the S&T group has the privileged chance to plug into the process on the ground floor. If however the government is in the midst of the process, then the S&T group will have to accelerate its activities to catch up with the process. Some of the information on the current status of negotiations can be found on the World Bank's web site ([www.worldbank.org/hipc](http://www.worldbank.org/hipc)). Below are the different actions needed at each stage (refer to schematic chart).

### ***Qualifying stage***

The S&T group should build its constituency and make the case for the need to include S&T within the preliminary document presented by the country to the World Bank and the IMF. It will help to meet with the missions coming from these financial institutions and make the same case to them.

### ***Decision stage***

This is a labour-intensive stage. The ultimate objective is to have S&T included in the Poverty Reduction Strategy Paper (PRSP), otherwise S&T cannot benefit from the debt relief funds. To reach this target, intensive and sustained analytical, technical and political efforts are needed.

*Sector work.* This entails an in-depth analysis of the current S&T situation of the country, to be presented in the later stages. The sector work should be broad based, using the modern concept of placing S&T in the context of 'national innovation systems.' It should therefore cover not only the production of qualified scientists and engineers but also strengthening the environment for

innovation, building and sustaining a small number of critical institutions, and ensuring both transparency, accountability, and adequate financing.

*Formation of a national team.* The results of sector analysis should be discussed with a broad base of businessmen, scientists, engineers, and educators, and other stakeholders, as well as officials from the ministries of finance and economics. Together, this team identifies issues and priorities in the national innovation system and eventually defines an S&T strategy, including regional and international alliances.

*Identification of policy options.* Based on the analytical work the next step is decide on the critical objectives of S&T development in the country. These objectives should be simple and clear and should translate into a few key areas and actions. While every country will have a differing set of priorities, it will be fundamental to decide on a limited number of areas critical to economic and social development that must be developed. The decision-makers should settle on a small number of focuses so that the strongest arguments can be made for their strengthening. These should include both science and technology.

With regard to research capacity building, agricultural research and extension is usually a critical area, but other possibilities include environment (e.g. desertification, deforestation, and loss of species variety); mining; oceanography; linguistics; parasitology and tropical diseases; etc. A research capacity will also be essential in the areas that support social development, such as basic health, social protection, and education. With regard to technology, all countries have at least some kind of incipient manufacturing or service sector that could become increasingly important over time. But the many very small enterprises choose their technologies with little knowledge of the wide range of available alternatives. The need is to establish or support outreach training programmes in elements such as quality and inventory control and simple productivity enhancing investments, as well as a programme of mini and micro-loans for improved productivity. Appropriate technologies from elsewhere need to be identified and local capacity and linkages with more advanced countries need to be developed in service areas such as metrology and standards. Technology centers can be established and linked with larger, more complete centers in the region or abroad, in part through networking.

In some cases, new applied research institutions or technology transfer institutions need to be created, provided they address critical national problems, are designed (or redesigned) in such a way as to ensure good governance, have the right incentives to respond to real demand, and have financial sustainability. These will often require well-engineered partnerships with outside institutions. Because of the small number of researchers and

institutions, it will be important to emphasize outside assessments of research productivity and relevance of individual researchers as well as institutions, often through international referees and review committees. Finally, given the small size and limited human resources of each country, particular attention must be paid to the possibility of the establishment and/or strengthening of regional R&D institutions, in spite of the observed difficulties some of these institutions have in ensuring individual country co-operation.

The strategies will inevitably have to focus on the importance of electronic networking (Internet), which will enable scientists and engineers to tap into regional and international institutions as well as communicate more effectively with each other. This could be one of the most effective means of reducing 'brain drain', since it permits the distance preparation of joint papers and research. It will also be important to support activities to strengthen Internet infrastructure as well as literacy, including community information centers catering to the needs of small business and civil society.

To ensure that goals can be met, policy options will especially need to focus on a means of ensuring long-term adequate financing and adequate institutional development. National development plans should include explicit financial and institutional support for S&T. This will include training of high-level researchers, technologists, and others, ensuring their return home after training to a nourishing environment, establishing permanent forums for dialogues between stakeholders in critical R&D areas; ensuring that R&D institutions are fully accountable, regularly evaluated, and have regular feedback mechanisms with all stakeholders; ensuring that the needs of the private sector, be it small subsistence farmers, small and medium enterprises, or larger firms both locally and foreign owned, are taken into account; and monitoring the adequacy of the political and economic environment for innovation. The financial alternatives for support of S&T should always include a portion of the debt relief explicitly directed towards long term sustainable support of S &T institutions, as appears to be the case in Uganda.

*National seminar.* The HIPC process requires that the arguments for inclusion of an element into PRSP be societal and not sectoral. To this end, the policy options identified earlier must be discussed and endorsed by a technical and societal group representing the different segments of the stakeholders. This is also consistent with the WCS's Science Agenda:

All countries should systematically undertake analyses and studies on science and technology policy, taking into account the opinions of all relevant sectors of society, including those of young people, to define short-term and long-term strategies leading to sound and equitable socio-economic development.

*Political seminar.* The results of the national seminar must be discussed with political decision-makers, particularly those who will be deciding what to be included in the country's PRSP. This is the ultimate advocacy and lobbying exercise.

*Formulation of guidelines for the use of debt relief for S&T.* A product of a successful political seminar is the formulation of a concise set of guidelines that will define why and how some of the debt relief funds will be invested in S&T within the strategy of economic development and poverty alleviation. These guidelines will constitute a part of the PRSP.

## **Jump on the process train wherever it is**

The ideal situation is for the S&T group to be engaged in this process as it commences. But if the commencement is missed, the S&T group should attempt to enter the process at whatever stage it is in.

- If the process is just beginning, then the S&T group will need to insist that the initial analytical work includes an assessment of S&T.
- If meetings of Government and civil society are being held to define policy, the S&T group will need to ensure that they are represented. As in the poverty development approach, a national debate and meetings among all stakeholders should both identify issues and priorities on S &T to build consensus on critical objectives. The approach of having two meetings, one to discuss issues, the second to get consensus on the overall strategy, would be an important means of giving legitimacy to the proposals. Even if this stage in the debt relief process has passed, the approach of national meetings for defining policy alternatives and building consensus fore S&T should be followed.
- If the PRSP is being written, then a chapter should be devoted to S&T.
- If the ten-year financial plan is being written or discussed, then the S&T group will need to ensure that adequate funding is built into the ten-year financial plan, both through debt relief and future lending.
- If the ten year development plan is under way, S&T groups will need to ensure that attention is paid to S&T issues in plan revisions. It should be emphasized that even after debt relief has been provided, the S&T group will have an opportunity to participate in the 2–3 year review of progress and subsequent revisions, including both national funding and international lending and assistance.



## THE ROLE OF UNESCO

On the basis of its long-standing experience in science-policy matters, and in the light of the outcome of the World Conference on Science, UNESCO is prepared to assist developing countries and countries in transition in their efforts to harness S&T for their social and economic development. For this purpose, the Division for Science Policy Analysis of the Science Sector is launching a S&T policy and management programme that will be carried out in collaboration with other pertinent Divisions, Sectors and Field Offices.

It is in such capacity that UNESCO envisages its role in the process of the debt-relief initiative described above. It is, indeed, a multiple role, comprising tasks and responsibilities such as:

- initiation and promotion of a multilateral dialogue between governments and sponsoring bodies, to examine principal issues relating to the use of debt relief for S&T;
- clearing-house functions involving provision of knowledge, information and expertise available at UNESCO with regard to S&T policies in developing countries;
- facilitation, mediation and monitoring, as needed, in the various stages of the process as described in the present document;
- assistance in the elaboration and implementation of regional strategies or strategies for specific groups of countries to favour science in the framework of the debt relief programme;
- integration of the debt relief initiative into UNESCO's S&T policy programmes, in the context of promotion of national science, technology and innovation systems.

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