



*Generation Challenge Programme
Strategic Framework*

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Table of contents

Acronyms and Abbreviations	ii
1 Introduction: Why does GCP need a Strategic Framework?.....	3
2 Mission, structure and products.....	5
2.1 Mission.....	5
2.2 Guiding principles.....	5
2.3 Structure.....	5
2.4 Product development and delivery pathways	7
3 GCP in the global development context.....	9
3.1 GCP in the scientific community	9
3.2 GCP and global development priorities	10
4 GCP’s research approach	12
5 Resource allocation	15
6 Conclusion	18
Annex 1: Further reading.....	19
Annex 2: GCP and the global development goals	20

Acronyms and Abbreviations

CGIAR	Consultative Group on International Agricultural Research
CIAT	Centro Internacional de Agricultura Tropical (International Centre for Tropical Agriculture)
FAO	Food and Agriculture Organization of the United Nations
GCP	Generation Challenge Programme
IFPRI	International Food Policy Research Institute
MDGs	Millennium Development Goal
R&D	research and development
SME	small- and medium-size enterprises
UN	United Nations

1 Introduction: Why does GCP need a Strategic Framework?

The Generation Challenge Programme (GCP) was established in 2003, the third of four Challenge Programmes of the Consultative Group on International Agricultural Research (CGIAR) launched so far.¹ The aim of these challenge programmes is to catalyse high-impact research and contribute substantially and rapidly to global development goals. The specific purpose of GCP is to explore plant genetic diversity and apply advanced genomics and comparative biology to improve the breeding of CGIAR-mandate crops grown by resource-poor farmers.

The Generation Challenge Programme was officially launched via the approval by the CGIAR Science Council of the document, *A Proposal to Establish a Challenge Program for Unlocking the Genetic Diversity of Crops for the Resource-Poor*.² This proposal presented the rationale and strategy for the Generation Challenge Programme and the structure through which the programme would be executed. It explains how GCP was created to undertake what are often referred to as the ‘upstream’ research activities of molecular characterisation of genetic diversity, comparative genomics, marker-assisted breeding and bioinformatics. The Programme also has a component dedicated to capacity building and enabling product delivery. GCP’s research, capacity building and delivery activities are organised under five subprogrammes and executed through two funding schemes: competitive and commissioned projects.

GCP’s founding document provided a clear path for getting GCP up and running. However, by GCP’s third year, critical questions had been raised regarding how GCP should balance its support between increasing scientific knowledge and delivering impacts to the resource-poor, and subsequently, how it should select and prioritise the regions and crops it supports.

To deal with these questions, GCP’s Management Team, made up of the Director and five subprogramme leaders, determined that a ‘strategic framework’ outlining GCP’s internal reflections on its mission, structure, research approach and resource allocation at this point in its development would be useful.

This Strategic Framework serves as a companion to the *Proposal to Establish the Challenge Program* and other subsequent programme documents, by identifying and clarifying some important issues in the large and complex task assigned to GCP. In addition, the implementation of GCP’s Strategic Framework is being supported and informed by a series of niched ‘reference studies’, the details of which are given in Section 5 of this document, on resource allocation.

This Strategic Framework reiterates GCP’s mission and explains its role in the global scientific and development communities. Additionally, this document describes, for the first time, GCP’s vision of the product development and delivery pathways that will serve

¹ More information about the CGIAR Challenge Programmes is available at:
<http://www.cgiar.org/impact/challenge/index.html>

² This document can be accessed at: <http://www.generationcp.org/brochure.php> entitled *Unlocking genetic diversity in crops for the resource-poor: a proposal for a CGIAR Challenge Programme*, February 2003.

resource-poor people. It also explains how GCP interacts, through its delivery plans, with other institutions in order to achieve impacts on the resource-poor.

GCP is expected to make impacts in many ways—by improving access to plant genetic diversity, by widening the global scientific knowledge base to better tackle drought, by improving breeding efficiency, by increasing the potential of research partnerships, and so on. But, **everything GCP does must have the ultimate goal of benefiting the resource-poor.**

This document also briefly reiterates how the programme is structured and how GCP differs from other research programmes. It explains GCP's approach to research in terms of how it balances the dual mandates of expanding the scientific knowledge base while, at the same time, benefiting the resource-poor. It describes GCP's resource allocation decision pathway—the process for determining what GCP will and will not support. Finally, this document identifies several ongoing reference studies that GCP will use to inform its decision making with regard to resource allocation.

Above all, this Strategic Framework has been developed to improve the parameters available for evaluating research opportunities. We hope that it is a useful guide for GCP's funders, collaborators and stakeholders.

2 Mission, structure and products

2.1 Mission

The Generation Challenge Programme is at the heart of a research and capacity-building network that uses plant genetic diversity, advanced genomic science and comparative biology to develop tools and technologies that help plant breeders in the developing world produce better crop varieties for resource-poor farmers. In line with this mission, by 2013, GCP is expected to have contributed to the following objectives:

- Provide access to, and promote the use of, genetic diversity in plant improvement programmes.
- Develop a public platform of genetic and genomic resources and tools, and support a global community that can use them.
- Generate and apply knowledge across crops, and demonstrate the potential of comparative genomics to contribute to plant improvement programmes.
- Use genetic diversity and advanced science to develop products for plant breeding programmes to improve the livelihoods of resource-poor farmers in marginal drought-prone environments.

2.2 Guiding principles

Given its mission and objectives, the following guiding principles can be identified that should govern all GCP actions:

- The needs of resource-poor farmers and GCP's stakeholders are the driving forces in the Generation Challenge Programme.
- GCP serves as a platform for characterising and using plant genetic diversity.
- In determining which avenues of research to pursue and how to allocate resources, GCP seeks out the best information available about current resources, tools, technologies and capacities in the agricultural research community.

2.3 Structure

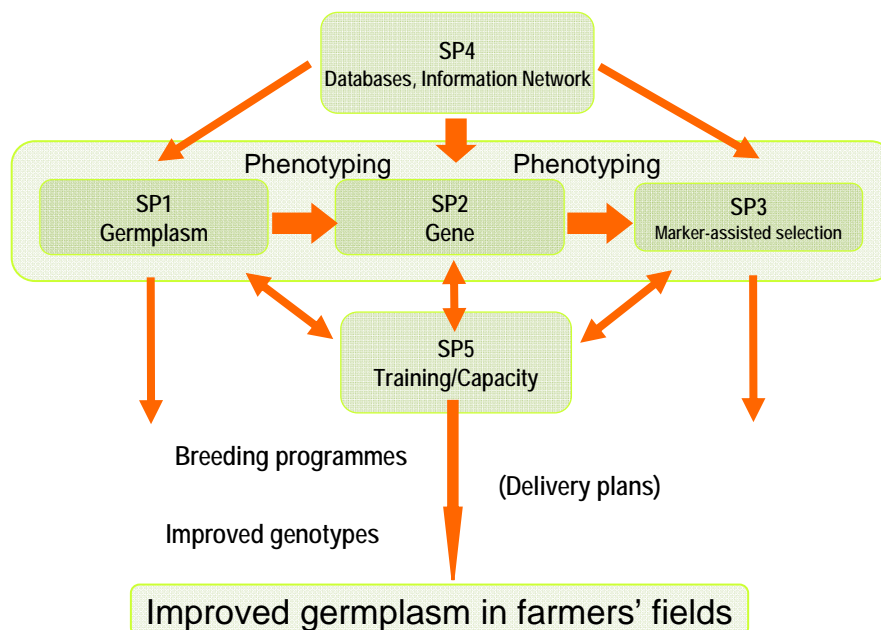
GCP's activities are organised into the following five overlapping and interactive subprogrammes (Figure 1):

1. **The Genetic diversity of global genetic resources:** Subprogramme 1 is charged with exploring the genetic diversity of global germplasm collections of the CGIAR mandate crops. The information gathered through this subprogramme is a primary resource for most other GCP research and research products.
2. **Comparative genomics for gene discovery:** Subprogramme 2 focuses on developing genomic tools, technologies and approaches for understanding the genetic basis of agronomically important traits in crop species important to developing countries. The main role of this subprogramme is to discover and validate the function of key genes involved in stress adaptation, notably drought tolerance.

3. **Trait capture for crop improvement:** Subprogramme 3 focuses on using new technological advances, in conjunction with proven methods, to increase the efficiency, speed and scope of plant breeding. The particular goal is to ensure that GCP generates products which are actually used in breeding programmes.
4. **Bioinformatics and crop information systems:** Subprogramme 4 develops information systems, analytical tools, protocols and other products, and also ensures their integration into the GCP network through a coherent and easily accessible information gateway.
5. **Capacity-building and enabling delivery.** Subprogramme 5 expands researchers' capacity to conduct cutting-edge research and seeks to bridge the technological gap between the various players from strategic research in advanced labs to application in the field (user communities). As such, this subprogramme promotes the use of GCP products.

Detailed information on the objectives, activities, milestones and achievements of each subprogramme is available in GCP's Medium-Term Plan. This is updated yearly and is available on GCP's website.

Figure 1 GCP's 5 subprogrammes



GCP is unique within CGIAR and the larger agricultural research-for-development community. It was founded to unlock the potential of plant genetic diversity as a means to modernise crop improvement programmes so that these serve the resource-poor. GCP was also assigned a trait on which to focus—drought tolerance, which affects almost all crops and all regions of the world, and therefore provides opportunities to apply useful discoveries across crops.

As no single institution can command the breadth of expertise and resources necessary to achieve these objectives, GCP relies on a network that can enable it to exploit significant

resources—funds, skills, equipment, knowledge and social capital—through partnerships with public and private institutions and initiatives. A critical benefit of the network is that it provides access to vast stores of plant genetic resources as well as to the cutting-edge technologies and scientific expertise needed to make these resources more useful for crop improvement.

GCP also employs an exceptional dual funding structure of competitive and commissioned grants. This provides the flexibility needed to capture emerging opportunities, promote innovative partnerships and develop appropriate product delivery schemes.

As of November 2007, GCP has 22 consortium members (9 CGIAR centres, 7 national research programmes and 6 advanced research institutions). In addition, nearly 50 advanced research institutions from the North and South and some 80 national research institutes are active partners in GCP projects.³ A broad cross-section of stakeholders is represented and participates in governing GCP.

GCP's network structure is proving a useful model for overcoming some of the traditional barriers that tend to frustrate innovation in established R&D systems, such as broken links between basic and applied research, and weak partnerships between advanced research institutions and national programmes in developing countries.

2.4 Product development and delivery pathways

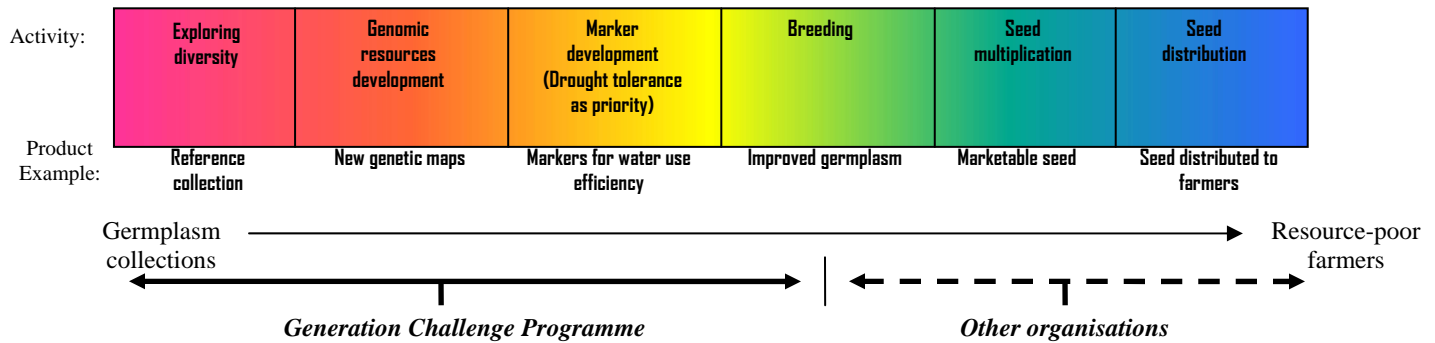
GCP products can be classified into the five broad categories of genetic resources, genomic resources, validated markers for breeding, new tools and methodologies, and training materials. GCP supports the development of a wide range of products. At almost every stage along the GCP research pipeline, the products generated either can have a direct impact on breeding efficiency or are useful for the next stage along the pipeline. For example, the high upstream germplasm characterisation conducted by SP1 can not only lead to the identification of a new pool of diversity for pre-breeding activities by national programmes but also help identify contrasting lines for genetic studies under SP2 and lines with favourable alleles for desirable traits to be used as donor lines in marker-assisted selection experiments in SP3.

GCP research products are delivered to other researchers (including gene bank curators, plant physiologists, geneticists, breeders and others) to enhance the efficiency of plant breeding programmes in developing crop varieties with traits that match the needs of resource-poor farmers in marginal environments.⁴ Higher crop productivity for such farmers means more food and higher incomes, enhancing food security for both the urban as well as the rural poor. GCP monitors the development and delivery of its research products through delivery plans premised on GCP's Delivery Strategy.⁵ Figure 2 illustrates GCP's product development and delivery pathway.

³ A list of members, partners, and funding agencies can be found at: www.generationcp.org/whoweare.php (see links in right-hand panel)

⁴ GCP defines marginal environments as those characterised by high-risk factors for crop production, poor yields and concentrated poverty.

⁵ See all strategy reference documents at: <http://www.generationcp.org/brochure.php#strategy>



Aside from direct research, GCP's capacity-building offers developing country scientists opportunities to improve their skills and abilities in specific research areas, to build research programmes in their home institutions and to interact with other scientists at the national, regional and international levels.

All GCP products aim to improve breeding efficiency, either directly or indirectly. Involving breeding programmes, seed companies or extension services in our delivery pathway is critical if we are to ensure impact on the resource-poor people who are the target beneficiaries of all GCP activities.

3 GCP in the global development context

GCP was established to address specific opportunities to support developing country agriculture. Many agricultural and socioeconomic factors, trends and opportunities have an impact on GCP's work, with the following being some of the principal ones:

- If widely applied, advances in plant breeding can literally transform the landscape in developing countries by addressing threats to agriculture such as drought. Yet most developing countries—with the exception of a few large and advanced national plant breeding programmes—have little access to the new technologies and skills that have sharpened the effectiveness of plant breeding in wealthier countries.
- The agricultural sectors of many developing countries are changing rapidly in response to a host of local and global factors. Farmers in more productive environments have opportunities to diversify out of staple food crops and are gaining access to new global and domestic agricultural markets. Farmers in marginal areas—typically characterised by high-risk crop production, poor yields and concentrated poverty—remain isolated, or are completely cut off, from outlets for farm inputs and support services, and from markets for their produce.
- Global climate models predict more extended and extreme weather events. Among the effects of climate change, the spectre of more prolonged and intense droughts is particularly disturbing (Box 1). Even favourable and irrigated environments are increasingly at risk from drought.

GCP is acutely aware of these external factors, which shape the planning and implementation of its research.

Box 1: The Drought Threat

By 2025, 1.8 billion people will experience an absolute shortage of water. Two-thirds of the world's population will live in what the UN's Food and Agricultural Organization (FAO) describes as a situation of water stress. According to FAO, drought is the "single most common cause of severe food shortages" in developing countries, surpassing other major causes such as conflict, flooding and economic problems. Most tropical and subtropical crops depend exclusively on rain. Irrigation is seldom an option when rainfall is inadequate. Governments make very few investments in irrigation for poor producers in marginal areas (World Bank 2006).

The economic impact of drought is enormous. The 2002-2003 drought in southern Africa resulted in a food deficit of 3.3 million t putting an estimated 14 million people at risk of starvation. Neither is drought only a problem for the developing world. The drought and heat wave that struck southern Europe in 2003 led to an estimated drop of 25 million t (or 12%) in cereal production.

Progress in improving crop drought tolerance has been slow and laborious, at great variance with the major investments of time, effort and resources made in this area over the past half-century. This is because drought is a complex trait that is difficult to breed for (Ribaut 2006).

3.1 GCP in the scientific community

By providing a global platform, GCP is making a valuable contribution to studying and accessing the genetic diversity of staple crops. Many national programmes and other public research organisations—particularly the CGIAR centres—maintain gene banks that conserve hundreds of thousands of crop accessions. GCP seeks to maximise the potential of these

genetic resources as sources of relevant traits for modern agriculture by conducting an extensive and systematic study of these accessions.

Another critical contribution is gathering and disseminating the new knowledge and data produced through these large-scale efforts. Subprogramme 4 deals with the protocols and infrastructure needed for the long-term storage, sharing and analysis of data arising from the network's international and interdisciplinary collaborations. This is a crucially important initiative: GCP is time-bound and the initiative provides the functional framework for managing the knowledge that will be GCP's most useful and enduring legacy when it winds up in 2013.

Many research institutions work in the same scientific domains as GCP, and most of them pre-date GCP. What GCP brings to the table is the ability to forge or rekindle links between these institutions as an 'honest broker'. Through these links, GCP successfully redirects the substantial investments in plant biology research towards research driven by the needs of resource-poor farmers. In this way, GCP helps bridge the divide between plant research and practical applications for farmers, thus enhancing and further extending the benefits of research to such farmers.

GCP is committed to collaborating with the private sector in a 'give-and-take' relationship. GCP identifies two types of private-sector organisations: large transnational firms and small and medium-size enterprises (SMEs). Partnerships with large transnationals are likely to focus on acquiring access to their technologies and expertise (the 'take'), while GCP sees SME partners as key users of its products and therefore key partners in plant breeding and seed distribution at the regional and local levels (the 'give'). But one size doesn't fit all, and such partnerships entail different legal and logistical considerations. Therefore, GCP will approach collaboration with both types of private-sector organisations on a case-by-case basis, assessing each partnership according to its merits.

3.2 GCP and global development priorities

GCP's support for developing new knowledge and products to increase food production directly addresses the UN's Millennium Development Goal (MDG) number 1 of "halving, by 2015, the number of hungry people and those living on less than a dollar a day." GCP's efforts to produce superior crop varieties that can be used by farmers offer the potential to improve the food and nutritional security and the income of poor farming households. They also offer the prospect of more affordable food for poor consumers.

GCP's work also contributes directly and indirectly towards achieving the other MDGs, as shown in the right hand column of Table 1 in Annex 2.

In addition, GCP activities contribute directly and indirectly to many of the CGIAR system's priorities (Annex 2, Table 2). They especially contribute to Priority Area 2, "Producing more and better food at lower cost through genetic improvement" and to Priority Area 1a, "Promoting conservation and characterisation of staple crops".

For the foreseeable future, public-sector research on staple food crops—especially on crops grown in marginal environments—will be indispensable to the survival and stability of poor

households in such environments. The economic alternatives to agriculture are often extremely limited in such areas. Investments in agriculture are among the most promising a nation can make to promote more rapid economic growth, while simultaneously improving the welfare of poor and marginalised populations (for details, see Section 3 of Annex 1, 'References and further reading'). GCP aligns with, and adds value to, the national and regional strategies and efforts of its partner countries to improve agricultural outputs and opportunities.

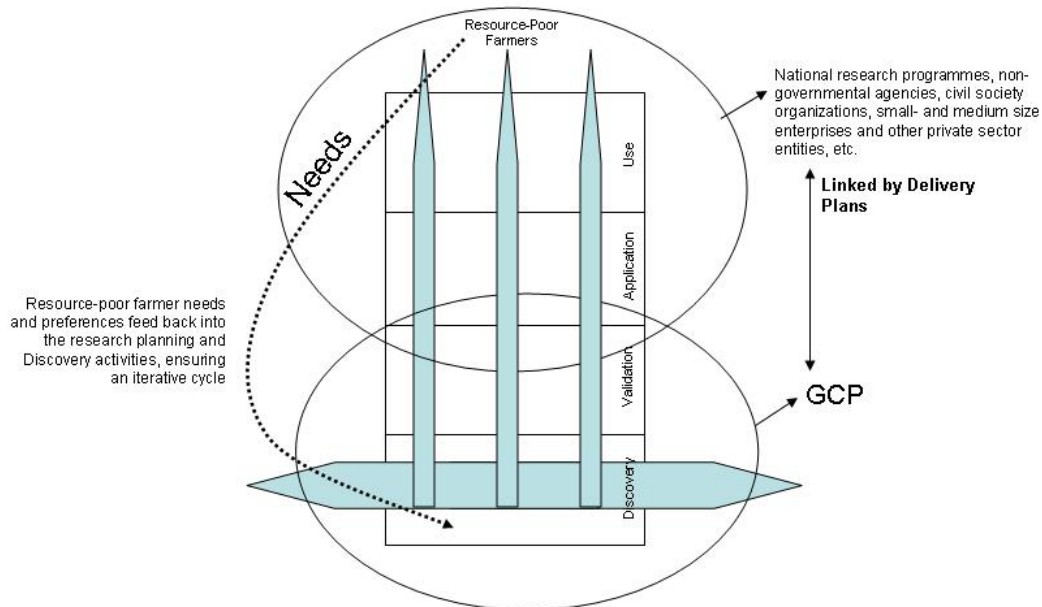
4 GCP's research approach

The rationale behind setting up GCP was to forge better links between basic and applied research. These links are needed in order to align the development of scientific innovations with the needs of resource-poor farmers. They are also needed in order to improve access to technologies for scientists in the developing world—technologies that can speed up and streamline their work, thereby improving efficiency and delivery to farmers.

GCP's mission encompasses both 'broadening the knowledge base' available for improving the world's staple food crops and 'developing specific products' that are useful to plant breeders. These are complementary but also potentially competing objectives.

Knowledge generation requires freedom to experiment with new ideas across disciplines and crops, while product development demands a clear roadmap for translating knowledge into tangible products. GCP's research approach is based on these two pillars so as to ensure that suitable knowledge is generated and potential products tested and validated in target environments within the larger, global context of producing useful products for resource-poor farmers. This scheme is illustrated as a set of vertically aligned activities, starting with discovery and moving up through validation, application, and use (see Figure 3). GCP does not necessarily conduct research in a sequential, linear or 'closed circuit' fashion. Some discovery research may not deliver promising outputs to be validated, with the result that such outputs would not proceed to the validation phase. Validation is not exclusive and focuses on end results and benefits to farmers, not the 'source' of the technology: for validation, GCP also draws on research conducted outside its network.

Figure 3 Research activities



The discovery phase expands the knowledge base on cross-cutting biological questions at different levels of plant architecture and across a broad set of crops, thus developing and

refining methodologies applicable to both genetic and genomic resources. This phase explores, and also creates, genetic diversity as a basis for identifying useful alleles. Methods include large-scale screening—using molecular markers—of germplasm in gene banks, the selection of reference sets, and subsequent phenotyping. New diversity can also be created through recombination (for example, synthetic lines) and other techniques. Candidate genes/genomic regions for plant responses to stress can be isolated in contrasting germplasm by blending molecular genetics, genomics and comparative biology with reliable plant phenotyping. This phase also includes developing new methodologies, protocols and databases to support GCP research.

The validation phase transforms results from the discovery phase into knowledge on gene function in priority crops and target environments. This phase is crop- and environment-specific and can simultaneously assess multiple traits by creating or selecting contrasting germplasm for agronomically important traits and by validating the effects of genes or genetic regions on the plant phenotype under specific experimental conditions. Activities in the validation phase are test cases for integrating and applying new knowledge and tools, and for identifying gaps and bottlenecks in applying new discoveries to plant breeding in target environments.

The application phase aims at using validated products (e.g. markers, screening methodologies, information tools) in breeding programmes to improve existing or develop new germplasm adapted to local conditions in target environments. This phase also incorporates traits to complement drought adaptation with other desired characteristics, such local tastes or cooking qualities.

The use phase aims at getting new varieties into farmers' fields. Activities here include seed multiplication and distribution, as well as socioeconomic studies related to the acceptability, benefits and enabling conditions for the adoption of new varieties (issues that ideally are considered when breeding priorities are determined and then revisited when farmers use, or fail to use, new varieties). Activities in this phase will be carried out by GCP partners, including CGIAR centres, national research systems, and small and medium-size local seed companies.

GCP generally focuses on discovery and validation and its management team designs proposal calls that cover these phases. External review panels⁶—guided by clear evaluation criteria—help the management team select the most promising projects. The application and use phases are carried out by other organisations, including national agricultural research programmes, non-governmental organisations, civil society organisations, and small and medium-sized private enterprises. GCP ensures a link between these two phases by requiring all research projects to develop delivery plans, as explained above. In addition to identifying

⁶ Proposals for competitive grants are evaluated by an independent panel of external reviewers. This panel ranks and submits to the Management Team (MT) written comments on the project proposals. The MT adjusts workplans and budgets where necessary, based on priorities and resources, before presenting selected projects for approval by GCP's Programme Steering Committee. Proposals for commissioned grants are developed with the close involvement of relevant Subprogramme Leader(s), who help(s) design the projects, determine the most appropriate partners, and formulate the project budgets. Subprogramme Leaders benefit from an external Review and Advisory Panel (RAP), composed of five individuals corresponding to the five subprogrammes. This panel advises Subprogramme Leaders on commissioned research proposals and also reviews ongoing commissioned and competitive projects.

potential groups of users, GCP requires that users be involved, to the fullest extent possible, in project planning and execution.

GCP is part of a large and complex research-for-development continuum and needs to form strong partnerships with downstream research and delivery organisations in order to maximise its potential for impact in farmers' fields. However, GCP recognises that delivery plans and downstream partnerships alone offer no guarantee that its research will result in improved livelihoods for the poor. Many factors affect the successful translation of research into impacts, most of which are outside GCP's direct control. Considering this, GCP increases the chances of success by setting up feedback loops from the users of GCP products (e.g. plant breeders and others) to researchers in the discovery and validation phases.

5 Resource allocation

As mentioned earlier, GCP-supported research is limited to the discovery and validation phases and GCP will continue to invest in both these phases throughout its life. In the short term, because drought adaptation is a very complex trait and we are still at the early stages of identifying key genes for this trait for use in plant breeding, investment in discovery should continue at the same high level as during GCP's first three years. However, as new knowledge is generated, it will naturally lead to specific products for use by resource-poor farmers. Therefore, investment in discovery will decrease over time, with a corresponding rise in expenditure on validation.

Resource allocation questions in GCP are not limited to the balance between discovery and validation activities. What about the balance in terms of crops and farming systems? GCP aims to improve the livelihoods of resource-poor farmers. But who and where are these farmers? What crops are important for their food security and income generation?

As a first step towards answers to these questions, GCP's management team commissioned a study in 2006 on *Targeting impacts in the GCP*.⁷ This study identifies the farming systems that are characterised by the highest levels of poverty, together with the crops grown in these systems. Crop production is represented in both tons and hectares, from which the relative importance of each crop to food security and income generation can be inferred. The study has provided much food for thought for the management team as to how it should implement this Strategic Framework.

The Targeting Impacts study is just one of a number of reference studies that GCP wishes to carry out. We plan to commission additional impact studies to provide up-to-date information on GCP's target crops and areas. Other proposed areas of possible study include the evaluation of infrastructure in national programmes, so as to gauge their ability to use GCP products, and assessing important traits for different farming systems and crops, so that GCP can consider these along with drought tolerance to ensure its products meet local demands.

In addition to the complex problems explored by these reference studies, other considerations complicate priority-setting, such as ongoing private-sector work on specific crops or the potential that hitherto neglected crops may have for improving the incomes of the poor.

Despite the complexities involved in identifying priorities, it is very important that GCP's first consideration whilst deciding where to allocate resources be to target poor people in drought-prone environments, and the crops they depend on. Following this primary consideration, the three other criteria that GCP must consider are: 1) partnership potential, 2) the state of the proposed technology, and 3) GCP's comparative advantage. GCP is a network and therefore relies on efficient partnerships to achieve its objectives. Support for a particular crop or research area must take into account the existing abilities of the research organisations in the field and of existing breeding programmes, as well as the quality of the partnerships that can be developed to conduct the research. Similarly, the state of the

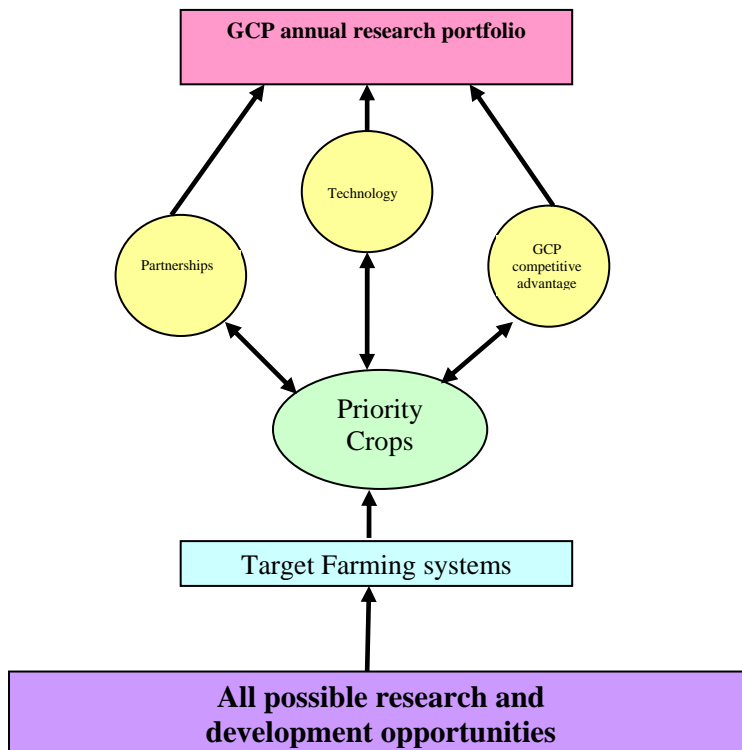
⁷ This impact study was undertaken by Glenn Hyman, Peter Jones and Sam Fujisaka (all from CIAT) and Stan Wood (IFPRI). A summarised version is available on the GCP website at [publications>recent publications>strategy>Strategy reference documents](#)

proposed technology must be assessed. GCP cannot fund technology ‘wild goose chases’; rather, it should support technological approaches that have a reasonably high chance of success. Finally, GCP must consider its own mandate and comparative advantage. GCP is charged with working on the CGIAR mandate crops; therefore, regardless of any high-quality partnerships and technology that a potential project might offer, GCP will not fund the work unless it focuses on a CGIAR mandate crop.

It is important to note that the recommendations of reference studies do not however override the scientific evaluation of research proposals themselves. GCP has clear guidelines for soliciting, submitting and evaluating project proposals, including the scrutiny of proposals by an independent review panel. GCP may define its areas of interest (ie, crops and/or target farming systems) based on the outputs of studies such as impact targeting exercises; but whether or not a given research proposal is approved depends on its quality. This is true for both competitive and commissioned research grants. Though GCP’s commissioned research scheme is specifically designed to enable the management team to commission research to fill gaps in the research portfolio, only high-quality research projects that meet the criteria established by GCP (see footnote 6) will be funded.

In brief, the GCP management team applies the resource allocation approach illustrated in Figure 4. First, studies such as the Targeting Impact study are used to gather information on the distribution of poverty, drought and crop production as a basis for identifying priority farming systems and crops. Next, the management team assesses the three elements of the potential partnerships, the technology and GCP’s comparative advantage. Questions to ask are:

- What technology is available, or needs to be developed, to facilitate meeting project goals?
- With which institutions should GCP forge partnerships to get the job done? And, given GCP’s mandate,
- Does GCP have a comparative advantage in the proposed work area?

Figure 4 Decision pathway for allocating GCP resources

By progressing through these criteria and filters, and by seeking answers to the many questions they raise, GCP can construct a coherent research portfolio that addresses the needs of resource-poor farmers, fulfils the Programme's mandate, and utilises its unique capacities. The decision pathway explained above will also be useful in evaluating GCP's current portfolio to determine whether ongoing projects fulfil these criteria. If they do not, they will be discontinued.

6 Conclusion

This Strategic Framework was developed to articulate how GCP intends to fulfil its mission of using plant genetic diversity, advanced genomic science and comparative biology to develop tools and technologies that will support plant breeders in the developing world in their efforts to produce better crop varieties for resource-poor farmers. The idea is not to revise GCP's philosophy or the way the programme works, as GCP is still a young programme; but rather to help refine GCP's position on complex issues that determine how and when the programme will achieve its mission, and to identify principles for developing programme priorities.

Perhaps the most important clarification this framework presents is the assertion that the programme should focus its research and capacity-building activities **on the places in the world that suffer from both poverty and drought**. This is important because, although GCP is a programme that uses technology to achieve its mission, its activities are not driven by advances in technology, nor by a single-minded desire to drive science forward, but rather by the needs of resource-poor farmers. This focus is the reason why GCP undertakes studies such as the Targeting Impacts study. Having defined the 'where' and 'what' of our work in terms of the big picture, projects to develop specific traits and germplasm can be defined and designed, in consultation with national plant breeders and other stakeholders.

Another new element presented in this framework is a proposed mechanism for determining GCP's priority farming systems, based on the frequency and combined severity of poverty and drought. This mechanism will allow the management team to focus GCP activities on a subset of the world's farming systems that will maximise the impact from GCP's limited resources. The mechanism for this—the reference studies—need refining, but the initial study is a critical first step in narrowing down and focusing GCP's impossibly broad scope.

The research approach identified in this paper is another useful new tool, as it unifies GCP's seemingly split personality in a single harmonious scheme that allows for both knowledge generation and product development.

In conclusion, this Strategic Framework provides useful insights into how GCP's management team can interpret the programme's mission and mandate, into the various tools the team should seek to develop, and into the principles the programme should follow to ensure that GCP continues to make sound decisions that will benefit the world's resource-poor farmers.

ANNEXES

Annex 1: Further reading

1. More information on GCP's research, structure, governance, funding and membership requirements is available at: www.generationcp.org. The *GCP Manual*⁸ is a good source of information on the structure, functions, challenges and history of GCP.

2. The following articles and publications review the literature on how agriculture contributes to pro-poor economic growth, nutrition, food security and macroeconomic stability.

Byerlee, D., X. Diao, and C. Jackson. 2005. *Agriculture, rural development, and pro-poor growth: Country experiences in the post-reform era*. Agriculture and Rural Development Discussion Paper 21. Washington, DC: World Bank.

Thirtle, C., L. Lin, and J. Piesse. 2003. 'The impact of research-led agriculture productivity growth on poverty reduction in Africa, Asia and Latin America.' *World Development* 31(12): 1959-1975.

Timmer, P. 2002. 'Agriculture and economic development.' In B. Gardener and G. Rausser (eds.), *Handbook of Agricultural Economics*. Vol. 2. Amsterdam: Elsevier. Pp. 1487-1546.

World Bank. 2005. *Agricultural growth for the poor: An agenda for development*. Directions in Development. Washington, DC: World Bank.

3. For additional information on the importance of drought and water management strategies, see:

Global Crop Diversity Trust. 2006. 'The Genetics of Water.' *Crop Diversity Topics, Analysis and Reflections*. No. 1.

Ribaut, J. M.. 2006 Drought tolerance in cereals. Haworth's Food Products Press, New York. Pp. 642.

World Bank. 2006. *Agriculture investment sourcebook*. Washington DC: World Bank.

⁸ Available online at [publications>recent publications>GCP manual](#)

Annex 2: GCP and the global development goals

Table 1 The United Nations Millennium Development Goals

Millennium Development Goal	Contribution of the Generation Challenge Programme
Goal 1: Eradicate extreme poverty and hunger	Through the development of new plant breeding knowledge and tools to develop robust varieties of staple food crops, which will help to increase incomes, nutrition and food security among rural and urban food producers and consumers.
Goal 2: Achieve universal primary education	Through improved household income status deriving from more successful agriculture.
Goal 3: Promote gender equality and empower women	Through enabling women to command more resources, including any additional food and income derived from more productive and profitable agriculture. Increasing numbers of women, especially in marginal areas, rely directly on agriculture for food and income and would benefit directly from varieties that grow better in marginal conditions. Benefits to women often yield benefits for children as well.
Goal 4: Reduce child mortality	Through improved household nutritional status and income status deriving from more successful agriculture.
Goal 5: Improve maternal health	Through improved household nutritional status and income status deriving from more successful agriculture.
Goal 6: Combat HIV/AIDS, malaria, and other diseases	Through improved household nutritional status and income status deriving from more successful agriculture.
Goal 7: Ensure environmental sustainability	Through the development of new plant breeding knowledge and tools to develop robust varieties of staple food crops that yield well with less water, on a smaller area, and with fewer agricultural chemicals.
Goal 8: Develop a global partnership for development	Through fostering partnerships that ultimately serve development goals.

Source: Millennium Goals described at www.un.org/millenniumgoals.

Table 2 CGIAR System Priorities (2005–2015)

CGIAR priority	Contribution of Generation Challenge Programme
Priority area 1: Sustaining biodiversity for current and future generations <ul style="list-style-type: none"> • Priority 1A: Promoting conservation and characterisation of staple crops • Priority 1B: Promoting conservation and characterisation of underutilised plant genetic resources • Priority 1C: Promoting conservation of indigenous livestock • Priority 1D: Promoting conservation of aquatic animal genetic resources 	GCP activities are directly relevant to 1A and, through activities involving crop wild relatives, also relevant to 1B
Priority area 2: Producing more and better food at lower cost through genetic improvements	Directly related to 2A and 2B; highly likely to yield future applications for 2C

<ul style="list-style-type: none"> • Priority 2A: Maintaining and enhancing yields and yield potential of food staples • Priority 2B: Improving tolerance to selected abiotic stresses • Priority 2C: Enhancing nutritional quality and safety • Priority 2D: Genetically enhancing selected high-value species 	and 2D
<p>Priority area 3: Reducing rural poverty through agricultural diversification and emerging opportunities for high-value commodities and products</p> <ul style="list-style-type: none"> • Priority 3A: Increasing income from fruit and vegetables • Priority 3B: Increasing income from livestock • Priority 3C: Enhancing income through increased productivity of fisheries and aquaculture • Priority 3D: Promoting sustainable income generation from forests and trees 	Potential future applications for 3A through the application of GCP approaches, methodologies, or other products to improve fruit and vegetable crops for developing country production
<p>Priority area 4: Promoting poverty alleviation and sustainable management of water, land, and forest resources</p> <ul style="list-style-type: none"> • Priority 4A: Promoting integrated land, water and forest management at landscape level • Priority 4B: Sustaining and managing aquatic ecosystems for food and livelihoods • Priority 4C: Improving water productivity • Priority 4D: Promoting sustainable agro-ecological intensification in low- and high-potential areas 	Directly relevant to 4C and 4D, to the extent that drought tolerance and other traits reduce plant needs for water and permit other adaptations that support agricultural intensification in environmentally sustainable ways
<p>Priority area 5: Improving policies and facilitating institutional innovation to support sustainable reduction of poverty and hunger</p> <ul style="list-style-type: none"> • Priority 5A: Improving science and technology policies and institutions • Priority 5B: Making international and domestic markets work for the poor • Priority 5C: Improving rural institutions and their governance • Priority 5D: Improving research and development options to reduce rural poverty and vulnerability 	Indirectly relevant to 5A (in seeking to establish a less traditional institutional approach to the practice of science and development of technology) and directly relevant to 5D (by contributing new knowledge and methods for agricultural research and development to address the needs of the rural poor)

Source: CGIAR System priorities described at www.cgiar.org/pdf/agm05/agm05_priorities_summary.pdf.