

Methodology for reporting against KPI4

– Number of people whose resilience has been improved as a result of project support

Guidance for applying this methodology to BRACED projects	1
Background	4
At what level in the log-frame/theory of change should KPI4 be measured?.....	4
KPI4 measures the resilience of INDIVIDUALS.....	5
KPI4 units, attribution, and dealing with a changing context.....	6
STEP BY STEP GUIDE TO DEFINING AND MEASURING KPI4.....	7
1. Identify beneficiaries, shocks and stresses, and their consequences	7
2. Develop a project theory of change.....	8
3. Identify factors affecting resilience that the project is expected to influence.....	9
4. Develop indicators of resilience	12
5. Establish how to identify unexpected consequences.....	18
6. Develop a sampling methodology	19
7. Calculate numbers of individuals with improved resilience as measured by indicators relevant to project activities and outputs	21
8. Attribution - estimate numbers with improved resilience as a result of the project.....	27
9. Report numbers with improved resilience as a result of project support (KPI4)	30

Guidance for applying this methodology to BRACED projects

This guidance describes how to estimate the numbers of people with improved resilience to climate shocks and stresses (that may be changing as a consequence of climate change) as a result of resilience-building and adaptation projects. The goal of the guidance is to enable projects to report against the UK International Climate Fund’s Key Performance Indicator No. 4 (KPI4).

The guidance describes how to identify and develop resilience indicators that are measured at the project outcome level, and how to use these to calculate numbers of people with improved

resilience within a beneficiary population. Guidance is offered on indicator measurement and aggregation, sampling methodologies, theories of change, attributing changes in resilience to project activities, and the identification of unintended consequences.

A key audience for this guidance will be M&E staff working on projects funded under DFID's Building Resilience and Adaptation to Climate Extremes and Disasters (BRACED) programme. The guidance is intended to help projects report against KPI4, which is a mandatory indicator specified in the BRACED log-frame, at the outcome level.

The measurement of resilience is a new and rapidly developing area of research and practice, in which the BRACED programme seeks to deliver significant learning. It is recognised that the level of rigour that can be applied to the measurement of resilience, and the relevance and appropriateness of different approaches and methodologies for measuring resilience, will vary significantly across project contexts. This might be due to the nature of the project itself, the characteristics of the beneficiary population, the availability of data, or other factors. In recognition of the diversity of project contexts, and the different levels of complexity and rigour that will be possible in these contexts, this guidance specifies a set of 'bronze', 'silver' and 'gold' standards for the measurement of numbers with improved resilience. The guidance is broken down into steps, and each step has its own set of bronze, silver and gold standards (some steps are not associated with standards, and in these cases a project is expected to follow the general guidance for that step).

The bronze standard represents the minimum standards that must be met by a project in order to report successfully against KPI4. All projects must meet the criteria specified under the bronze standard. Silver and gold standards are associated with more complex and rigorous methods that may or may not be applicable/appropriate in a particular project context. Projects are not expected to fulfil all the criteria associated with silver and/or gold standards. However, they are encouraged to work towards these standards as far as possible within the constraints of the project context, data availability, and other relevant factors.

It is important to emphasise that a project can meet different standards for different steps – the standards apply to the steps and methodologies used for the measurement of resilience to report against KPI4, rather than to the quality of the project as a whole. Project evaluations will consider the extent to which a project has employed the most appropriate methodologies (which might be associated with any one of the three standards), and the extent to which these methodologies were successfully implemented to deliver learning. Learning can also include lessons on where and why certain methodologies (which might be associated with the silver or gold standards) are not appropriate.

In order for BRACED to fulfil its learning goals, it is expected that a subset of projects will work towards meeting the gold standard for as many steps as is feasible. In particular, it is expected that some projects will employ experimental methods associated with the use of control populations in a manner that echoes randomised control trials as used in the health sector. Projects are encouraged to volunteer for piloting of the silver and gold standards where staff feel that projects have the potential to achieve these standards.

All projects will receive support from the BRACED Knowledge Manager (KM) to help them develop and apply the methodologies associated with the different standards. For any given step, projects seeking to meet silver and gold standards will necessarily require more support from the KM than those seeking to meet the bronze standard. Projects should decide what standards they will seek to meet by the end of the project development phase (where meeting silver or gold standards is clearly impractical, projects are encouraged to be explicit about why this is the case - such narratives have an important role to play in learning). The nature of the technical support to be provided to projects will then be negotiated with the KM during the project inception phase.

Bronze, silver and gold standards have also been developed for the use of climate data, and for the measurement of project impacts, as well as for the linking of resilience indicators at the outcome level with well-being indicators at the impact level. These standards are detailed in the BRACED Guidance on Indicators and Baselines, provided alongside this guidance

Background

KPI4 is a Key Performance Indicator (KPI) in the DFID-funded International Climate Fund (ICF). However, the indicator can be used for any project for which increased resilience is an objective. It is an outcome indicator in DFID's **Building Resilience and Adaptation to Climate Extremes and Disasters** (BRACED) portfolio log-frame.

KPI4 measures the number of people with **improved resilience due to a project intervention**. This means:

- (a) KPI4 measures number of people with a **change** in resilience;
- (b) KPI4 focuses on changes in **those attributes of resilience affected by the project** in question;
- (c) KPI4 is **not** a measure of absolute resilience.

This guidance outlines a step-by-step methodology to help projects (i) identify context-specific resilience indicators, (ii) use these indicators to track changes in resilience resulting from project activities, and (iii) use the indicators to report against ICF KPI4. Some of these steps are associated with a range of methods and approaches that involve varying levels of complexity and rigour. For each of these steps, a table is provided illustrating what is required for three different standards: bronze, silver and gold. The bronze standard describes minimum standards for measurement, analysis and reporting as required by DFID. The silver and gold standards describe optional additional measures that may enhance the rigour of resilience monitoring and evaluation (M&E), that can be taken where circumstances allow and where this will add value to a project M&E system in terms of reporting and learning. Where a step is not associated with a table of criteria for bronze, silver and gold standards, a project is expected to follow the general recommendations in that step.

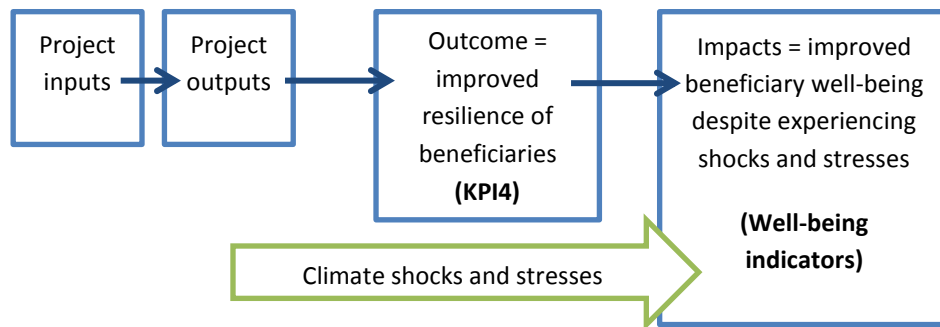
Here, resilience to climate shocks and stresses (that may be intensifying as a result of climate change) is considered to be a composite attribute possessed by each individual, that represents their **ability to anticipate, avoid, plan for, cope with, recover from and adapt to (climate related) shocks and stresses**. Improved resilience means that an individual is better able to maintain or improve their well-being despite being exposed to shocks and stresses. KPI4 measures how many people have experienced improvements in this composite attribute as a result of the project that is being monitored.

KPI4 is applicable to projects that target (directly or indirectly) individuals and households. In these contexts KPI4 will be derived from context-specific indicators of resilience at the individual or household level. However, it is also possible to apply KPI4 to resilience projects aimed at institutional capacity building or policy change. This means answering the question 'How many people have had their resilience improved through this increased institutional capacity' or 'how many people have had their resilience improved through this change in policy?'

At what level in the log-frame/theory of change should KPI4 be measured?

KPI4 will normally be an **Outcome Indicator**. This is because project related change in resilience to climate shocks and stresses is usually an outcome of one or more project activities and outputs. Increased resilience should mean that people are less likely to suffer losses, damages, and declines in their well-being when they encounter a shock or stress. Improved human well-being and a

reduction in losses and damages resulting from climate shocks and stresses is the ultimate purpose of climate change adaptation programmes, as measured at the impact level, as shown in Figure 1.



Theory of change (ToC): without the project, beneficiaries would have been less resilient to climate related shocks and stresses and therefore performance of well-being indicators (e.g. income, deaths) would be worse than in the 'with project' scenario

Figure 1. General theory of change for resilience.

Normally, at the start of a project, the indicators from which KPI4 is to be derived represent certain attributes that the project's Theory of Change **predicts** will make individuals less vulnerable to climate related shocks and stresses. Later, if the project monitoring system is sufficiently robust, it may be possible, after the project's outputs have affected a sufficient number of people and if climate related shocks and stresses have occurred, to correlate KPI4 components with actual well-being impacts. At this stage KPI4 can be adjusted to be closer to a proven indicator of resilience. This is an important learning process. Good resilience indicators – measured before a shock or stress occurs - should be significantly correlated with indicators that capture losses, damages and changes in well-being associated with that shock or stress, measured after it has occurred. In other words, resilience indicators should be **predictive** of future changes in well-being resulting from shocks and stresses.

KPI4 measures the resilience of INDIVIDUALS

Resilience as a concept can apply to individuals, households, communities, systems, ecosystems, etc. **KPI4 is concerned specifically with the change in resilience of individuals.** However, it is recognised that the resilience of an individual also depends on the resilience of the household, community, systems and ecosystems in which they live – therefore the context in which the individual lives is very much part of the resilience story we are trying to understand and measure.

This means that if a project improves the resilience of all members of a household, then all members of the household would be counted. KPI4 measures the resilience of individuals because there can be large differences, even within the same household, in how individuals are affected by either a project intervention or by a climate related shock or a stress.¹ We are very interested in these differences, and also in the differential outcomes of any project intervention on different categories of individual. As a result of these intra-household differences in resilience and project impacts, KPI4

¹ In Bangladesh, for example, of the 140,000 people who died from the flood-related effects of Cyclone Gorky in 1991, women outnumbered men by 14:1.

should always be disaggregated by gender. Disaggregation based on other categories of beneficiary (e.g. children, the elderly, marginalised groups, individuals engaged in different types of livelihood, etc.) may also be desirable.

KPI4 units, attribution, and dealing with a changing context

There are no agreed units in which ‘resilience’ is measured. This is because resilience is extremely context specific. Therefore resilience is dealt with as a relative attribute in each specific local context. Individuals can be considered ‘more’ or ‘less’ resilient to climate related shocks and stresses as a result of the context in which they live, and of their gender, age, poverty level, type of livelihood, geographical location etc.

A project intervention may make individuals more or less resilient to shocks and stresses. KPI4 is defined in such a way as to take into account the change specifically due to a project intervention:

KPI4 - Number of people whose resilience has been improved as a result of project support

Therefore, we are not measuring the absolute level of resilience – but rather the relative change in resilience due to the project intervention – and specifically the number for whom this change is positive. This means that KPI4 may not necessarily show the trend in overall resilience² (whether it is getting better or worse) – because it focuses on the change that can reasonably be attributed to the project.³ This focus is achieved by choosing to measure specific aspects of resilience that the project targets or is expected to affect (see example in Table 1).

Table 1. Example – choosing aspects of resilience that reflect the project intervention

Project intervention	Possible aspect of resilience to measure⁴
Improved flood early warning systems	Number of men/women using improved flood early warning systems to reduce risks to their lives and/or property
Labour based safety net	Number of men/women accessing the safety net system (or planning to access it if the measurement takes place in advance of the shock)
Drought resistant agricultural techniques	Number of men/women with sustained adoption of the crops/techniques promoted by the project (e.g. exhibiting a sustained behaviour change)

² By overall resilience we mean resilience due to all possible factors – whether they are relevant to the project intervention or not.

³ Of course the overall trend is very important in the overall project design, and is an important part of the context against which KPI4 should be reported.

⁴ In each case the aspect of resilience being measured would be based on the project theory of change, supported by evidence as described in Steps 2 and 3.

STEP BY STEP GUIDE TO DEFINING AND MEASURING KPI4

1. Identify beneficiaries, shocks and stresses, and their consequences

Describe the resilience context using the DFID Resilience Framework (Figure 2). This is usually done as part of the project design, and should involve a combination of methods including participatory assessments.

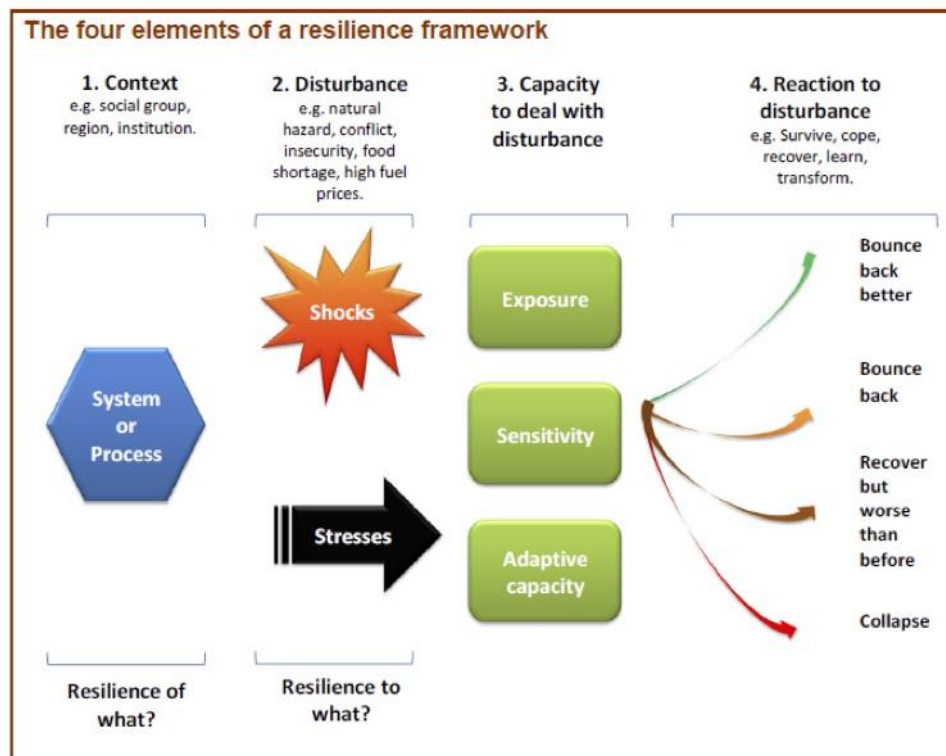


Figure 2. The DFID Resilience Framework.

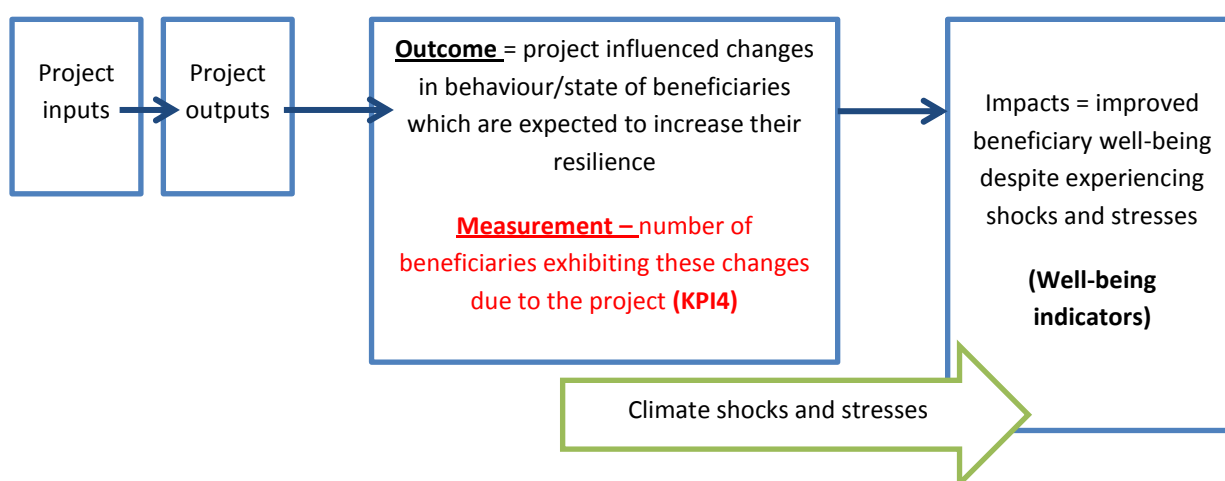
- a. Identify key climate shocks and stresses to which people need to be more resilient (Element 2). This should include existing shocks and stresses and potential future shocks and stresses over timescales relevant to the project. A project may develop indicators to track changes and variations in shocks and stresses, to provide a context for the interpretation of project results. Such indicators are outside the scope of this guidance on KPI4, but are addressed in the *BRACED Guidance on Indicators and Baselines*.
- b. Identify key consequences of climate shocks and stresses such as losses, damages and negative effects on human well-being (e.g. increased poverty, worse health outcomes, etc.) (Element 4). The long-term impacts to which the project contributes will be the amelioration of these consequences, represented by indicators that measure changes in human well-being and changes in losses from shocks and stresses. These indicators will be developed and measured as part of the wider project M&E system and are outside the scope of this guidance on KPI4, but are addressed in the *BRACED Guidance on Indicators and Baselines*.

- c. Identify the beneficiaries to be targeted, and the key systems and processes (Element 1) on which individuals and households depend, and that influence their resilience to climate related shocks and stresses.

2. Develop a project theory of change

A theory of change should have been developed during the project design phase. If a project is not associated with a theory of change, one will need to be developed.⁵ The theory of change describes the links between project outputs and outcomes, and between outcomes and impacts. It makes explicit the assumptions behind project design. The theory of change should articulate how project outputs will improve resilience, and with what changes these improvements in resilience will be associated (e.g. changes in behaviour, assets, access to certain resources, etc.). These are the changes that will need to be measured so that a project can report against KPI4, as in Figure 3.

Figure 3 – Illustration of where KPI4 fits in the ToC



A theory of change may be revised throughout the lifetime of a project as new information and learning about resilience become available. The theory of change developed during the project design phase might be updated based on the results of any participatory assessments conducted to identify factors important for resilience that will be measured as part of design of an M&E system in order to report against KPI4 (see Steps 3 and 4 below).

The next five steps explain how we identify and measure the changes expected to increase resilience. Step 8 explains how we assess the contribution of the project to any such changes, and Step 9 addresses how to report the results for KPI4.

⁵ Guidance on developing Theories of Change is available here:
http://r4d.dfid.gov.uk/pdf/outputs/mis_spc/DFID_ToC_Review_VogelV7.pdf
<http://zunia.org/post/sea-change-cop-ukcip-guidance-note-3-theory-of-change-approach-to-climate-change-adaptation-pro>

3. Identify factors affecting resilience that the project is expected to influence

A project's theory of change and/or log-frame should describe the factors that affect the resilience of beneficiaries, and how the project will influence these factors to improve resilience. These will be factors that affect people's ability to anticipate, avoid, plan for, cope with, recover from, and adapt to climate (and perhaps other related) shocks and stresses. These factors, and the actions required to improve resilience, can be identified using a combination of methods, including surveys, questionnaires, interviews, and participatory assessment (Box 1). This should be done during the project design phase. However, this may result in a quite superficial characterisation of resilience (for example based on the understanding of project staff rather than beneficiaries), in which case a more detailed assessment of the factors affecting resilience might be appropriate as part of the development of an M&E system. For example, this might be appropriate where a project indicates that specific outputs will enhance 'coping capacity' or 'adaptive capacity' (see Box 2 for an exploration of the difference between coping capacity and adaptive capacity). In such cases, further participatory assessment of the factors that help people to cope or adapt might be required early during project implementation, so that these factors can be represented by indicators (Step 4) that tell us whether coping or adaptive capacity has improved as a result of the project's intervention.

Participatory assessments might provide information that can be used to refine a project's theory of change, by identifying previously neglected factors influencing resilience, by providing more nuanced narratives about how different aspects of resilience interact, and by providing further detail about the mechanisms that determine who is least/most affected by climate shocks and stresses, and why.

When considering the factors that are important for resilience, that a project will seek to influence, it may be helpful to consider the **dimensions** of resilience (Box 2). This is a way of checking whether all the relevant aspects of resilience that might link project outputs to intended project impacts have been considered. Not all of these dimensions will be relevant in a specific project context, and this procedure is intended to provide some light-touch quality assurance rather than to be prescriptive.

At the end of this step, project M&E staff should have identified a set of factors that are important for resilience, and that are expected to be influenced by the project.

It is also useful to list any factors affecting resilience that the project is unlikely to influence. Changes in these factors might act to increase or reduce resilience in general, and such changes need to be understood to provide context for the interpretation of project results. A discussion of how to interpret project results in the light of wider trends towards reduced or increased resilience is outside the scope of this guidance. However, it is important to identify such trends where possible.

Box 1. Using participatory methods to identify determinants of resilience

Participatory assessment can be used to identify factors that influence resilience, and to prioritise these factors in order of importance. Focus groups, consultations using H-forms (see below) and participatory resilience rankings can be used to understand the 'resilience context' of a project, to identify factors and processes to be targeted by a project, to identify factors and processes that can be measured to determine whether resilience has increased or decreased, and to prioritise these factors in order of importance.

1. How to characterise resilience using focus groups

- (a) Organise a representative series of focus groups covering different respondent types (women, men, youth etc.), livelihood types and geographical spread.
- (b) Discuss existing or emerging climate shocks and stresses, and what elements makes some people or households more 'able to cope' than others? While the group should lead the discussion with people making their own suggestions, some prompting may be required to ensure all elements are covered here. It might be useful to use a checklist based on the 'dimensions' of resilience detailed in Step 2.
- (c) Discuss the capacity of local institutions to provide support in times of emergency.
- (d) Prioritise the elements of resilience (this can be done by drawing each 'element' on a card – and getting the group to arrange the cards in order of priority on the ground).
- (e) For each 'element', get the group to characterise what different levels of 'ability to cope' look like (e.g. use a three point scale of high, medium and low ability). Where different 'dimensions' of resilience are defined, this process might be repeated for each dimension, for example: ability to cope in the short term, ability to adapt in the longer term, ability to access a key resource, etc.
- (f) Get the group to consider key actions that individuals, the community and outside organisations can take to enhance 'the ability to cope/adapt' for each element – this should provide the link between interventions and elements of resilience (it is also an important reality check to ensure the proposed project interventions are relevant to the resilience elements prioritised by the community).
- (g) Across a number of such FGs, the results from step (d), combined with information from key informants and locally relevant past experience, and knowledge of the proposed intervention, should be used to identify the elements of resilience to be used to measure KPI4, and to construct appropriate context-specific indicators (Step 3).
- (h) Baseline and monitoring data might be collected by getting focus groups to identify how many people in their community are in each level of 'ability to cope'. Alternatively, beneficiaries might be sampled by getting individuals to estimate which level they are in.

2. Use of scale or H-forms

Another way of approaching the gathering of baseline and monitoring data, without the need to define levels in advance, is to use a scale or H-form. This is a form with a horizontal axis running between two extremes (e.g. very low ability to cope and very high ability to cope), which forms the 'H'. Respondents place a cross at a position along the horizontal axis to indicate their own situation. Responses can be converted into categories or scores based on the position of the cross along the horizontal axis. Changes in positions along the axis over time can be assessed to monitor how resilience is changing. Reasons for a low or high score for a particular individual, or general factors that determine whether a score is low or high, can be noted at the appropriate extremes of the 'H', e.g. using cards or post-it notes. These can provide similar information to that generated in activities (b) and (c) above (the latter if people are asked to arrange answers in order of importance). Information similar to that in activity (g) might also be recorded as part of an H-form exercise.

3. Participatory resilience rankings

Well-being ranking is an established technique for enabling a group of key informants to rank the 'well-being' of households in a specific community. It should be possible to use a similar methodology to rank households according to 'ability to cope with climate change'. Such an approach can be used:

- (i) To monitor change over time, and interrogate reasons for changes in resilience, thus also providing information on attribution/contribution.
- (j) As a starting point for discussion of components of resilience and associated indicators (why are these households at the bottom? What are their key characteristics?, etc.), and thus as an aid to the definition of resilience indicators.

Improved resilience is viewed as an outcome, and improved well-being as an impact, in the resilience theory of change (as shown in Figure 1 above). Participatory well-being rankings are also useful for tracking changes in well-being over time that can be linked (or not) with changes in resilience over time. Well-being rankings therefore complement resilience rankings by allowing us to test (i) a project's theory of change (ii) the appropriateness of the resilience indicators selected, and (iii) the extent to which improved resilience results in

improved well-being in the longer term.

Box 2. Dimensions of resilience

A number of studies define 'dimensions' of resilience, which have similarities to the five dimensions or 'capitals' defined in earlier livelihood frameworks. For example, a study by Oxfam GB defines five dimensions of resilience which were applied to a study of disaster risk reduction in Ethiopia's Somali region⁶. A study commissioned by DFID and undertaken by the authors of this guidance reviewed a number of methodologies for measuring resilience, and identified nine, very broadly defined, 'dimensions' of resilience based on these methodologies⁷. These are listed below. Dimensions 1-5 were common to all the methodologies reviewed that defined dimensions of resilience. Dimensions 6-9 represent factors that were identified by a subset of the methodologies reviewed. It is not recommended that these dimensions are used in a prescriptive manner. However, they may be useful as a loose framework for guiding the process of identifying contextual factors that are important in influencing resilience.

1. **Assets**, including physical and financial assets, food and seed reserves, and other assets that can be deployed or realised during times of hardship to help people absorb losses, and recover from stresses and shocks. Debt could be considered as a negative asset.
2. **Access to services**, including water, electricity, early warning systems, public transport, and knowledge and information that helps people plan for, cope with and recover from stresses and shocks, and how vulnerable these services are themselves to shocks and stresses.
3. **Adaptive capacity**, including factors that specifically enable people to anticipate, plan for and respond to changes (for example by modifying or changing current practices and investing in new livelihood strategies). The ability to adapt to changes in any of the other dimensions listed here might also be included.
4. **Income and food access**, including the vulnerability to shocks and stresses of income sources and food supplies (including food prices/ability to purchase or otherwise access food, and the vulnerability of food supply chains to local and remote shocks and stresses).
5. **Safety nets**, including access to formal and informal support networks, emergency relief, and financial mechanisms such as insurance.
6. **Livelihood viability**, in terms of the extent to which an individual's livelihood can be sustained in the face of a shock or stress, or the magnitude of shock or stress that can be accommodated before a livelihood ceases to be viable.
7. **Institutional and governance contexts**, including extent to which governance processes, institutional mechanisms, policy environments, conflict, and insecurity constrain or enable coping and adaptation. It can include community level capacity to cope with and adapt to shocks and stresses and to support those living within it.
8. **Natural and built infrastructural contexts**, including extent to which coping and adaptation is facilitated or constrained by the quality of built infrastructure (e.g. roads), the quality/functioning of environmental systems/natural resources (e.g. health of ecosystems providing livelihoods), and geographical factors (e.g. remoteness) and the vulnerability of the infrastructure to shocks and stresses.
9. **Personal circumstances**, including any factors not covered by other dimensions that might make an individual more or less able to anticipate, plan for, cope with, recover from, or adapt to changes in stresses and shocks. These might include psychological resilience, past experience of coping, personal connections (social capital), health, socio-economic status, etc.

Coping capacity versus adaptive capacity

⁶ Hughes, K. 2013. A Multidimensional Approach for Measuring Resilience. Oxfam GB Working Paper. Paper presented at the Expert Consultation on Resilience Measurement Related to Food Security sponsored by the Food and Agricultural Organization and World Food Program, Rome, Italy, February 19-21, 2013

⁷ Brooks, N., Aure, E. and Whiteside, M. 2014. Assessing the impact of ICF programmes on household and community resilience to climate variability and climate change. Evidence on Demand for DFID.

A commonly used dimension of resilience is 'adaptive capacity', which addresses people's ability to modify their behaviour and (e.g. livelihood) practices to respond to longer-term changes in climate and other phenomena. It is important to consider the relative importance of factors that affect people's ability to cope in the short term, and factors that affect their ability to adapt in the longer term. This will depend on the nature of the stresses and shocks faced, and the timescales with which a project is concerned. Coping capacity should not be built at the expense of adaptive capacity where this risks locking people into systems or behaviour that may be more resilient to some shocks (e.g. those faced in the near term) but at greater risk of catastrophic collapse from others (e.g. those to which populations might be exposed in the medium to long term). While participatory assessments may be very effective at identifying factors important for coping capacity (based on recent historical experience), they may be less useful in identifying factors that can help people adapt, due to a lack of historical precedent on which to base such identification. Nonetheless, where climate trends are already well established, factors that have enabled people to adapt to recent changes might be identified.

4. Develop indicators of resilience

Develop indicators that capture the aspects of resilience identified in Step 3 **that the project seeks to address or is likely to influence**. These indicators need to link project outputs with intended project impacts in a way consistent with a project's theory of change and with the overall resilience theory of change (Figure 1). Resilience indicators track the changes that are expected to occur at the outcome level, as a result of project interventions.

Beneficiaries should have a role in the selection and verification of indicators, which will be highly context-specific, and this can be via an extension of the participatory processes associated with Step 3 above. Resilience indicators should clearly link project outputs (the mechanisms through which the project seeks to increase resilience/reduce vulnerability) with the factors that make people resilient, based on the findings of participatory surveys and other methods as detailed in Step 3.

Resilience indicators and their relation to project outputs

Resilience indicators should seek to capture changes in people's behaviour or circumstances that will make them better able to anticipate, avoid, plan for, cope with, recover from, and adapt to the shocks and stresses that they are likely to face in the foreseeable future. As projects will be designed to deliver outputs that (it is assumed) will deliver such changes, measures of resilience might be based on the uptake of project outputs. Such indicators would seek to measure how many beneficiaries (i.e. people receiving support from a project) actually translate that support into the changes in practices or circumstances in which it is intended to result. These indicators might also seek to measure the sustainability of such changes (e.g. will they persist after the project ends?). Box 3 provides an example of the measurement of resilience attributes for a project that promotes the adoption of drought resistance crops and the use of micro-irrigation, and supports the development and dissemination of seasonal or shorter-term forecasts and savings schemes. These measurements are combined into a single indicator of resilience (see also discussion below).

In the example in Box 3, indicators 1-4 effectively measure changes in behaviour to which project outputs are thought to have contributed, and which the research conducted as part of the project design process has indicated should increase the resilience of beneficiaries to climate shocks and stresses. Indicator 5 (current savings) measures a change in circumstances that may be due to a

number of project outputs (i.e. participation in the savings groups and income from the micro-irrigation), and which is also expected to contribute to increased resilience in its own right.

While resilience indicators may be closely related to the uptake of project outputs, supported by good evidence that such uptake is likely to improve resilience, it is highly desirable to complement these indicators with indicators of changes in behaviour, practice or circumstances that follow from the uptake of project outputs. Outcome indicators that are further removed from project outputs than the example indicators discussed above and in Box 3 can be very helpful in understanding longer-term changes in behaviour or circumstances. They also can be helpful in monitoring a change in behaviour, practice or circumstance to which several different project outputs may contribute – an example is the savings indicator in Box 3, to which both membership of a savings group and income from micro-irrigation might contribute. These indicators may be particularly useful for comparing beneficiary populations with control populations (see Steps 6 and 8 below).

An example of a resilience outcome indicator one step removed from the output might be the number of months in the growing period that people in marginal rainfall areas, where periods of water deficit are common, have access to adequate water for agricultural activities, or the number of months in a year that they have daily access to a reliable source of potable water. This might be achieved through the installation of irrigation systems or piped water infrastructure, but these indicators are based on access to water itself rather than to infrastructure delivered by a project. The indicators thus have two advantages over output-focused indicators:

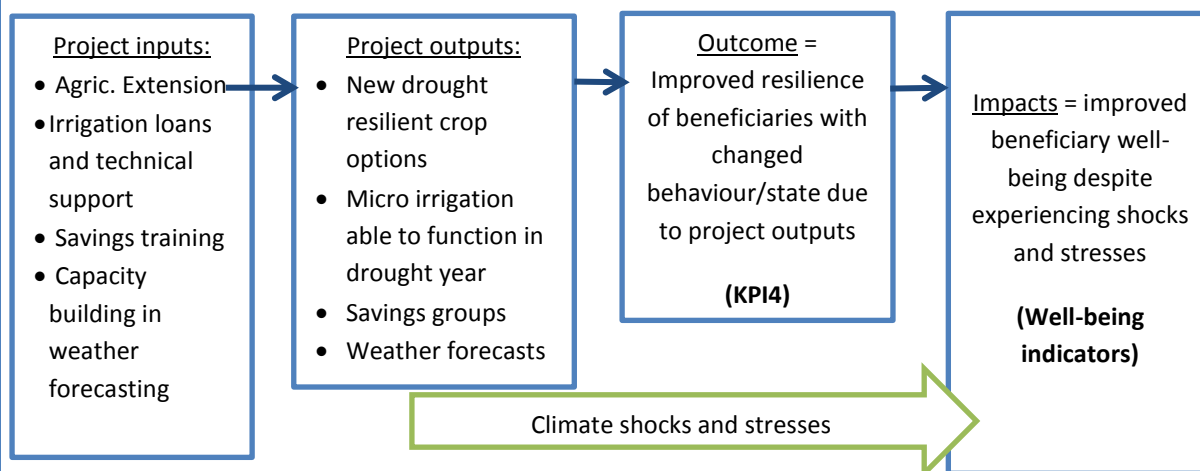
- i. They tell us whether the infrastructure actually delivered the intended outcome (better access to water). This is critical to assessing a project's success – a project might deliver irrigation or piped water infrastructure, but this must be sufficient to meet demand and address existing water deficits, as well as being sustainable in terms of supply.
- ii. They can be used to compare access to water between the beneficiary population that receives the infrastructure, and a control population that does not, and thus can tell us whether the beneficiary population is better off (compared to the control population) as a result of the intervention.

In order for such outcome indicators to be considered good resilience indicators, they need to be linked to a theory of change, with sufficient evidence to show that better access to water in 'normal' years would be sustained in periods of shock or stress.

Another example of an outcome indicator might be when the theory of change indicates that resilience is improved by better access to the nearest urban centre, market, or hospital. A project might support the building of roads to improve links between rural and urban areas, but if people do not have access to motorised transport this might make little difference to their access to markets or services. An output-focused indicator in such a context might be road density or average distance from a road. A resilience outcome indicator might be based on people's perceptions of the accessibility of markets or services. This could be based on a question that asks people 'How easy is it for you to get to the market/hospital/town/etc?', with answers based on levels of difficulty that can be used to assign a score to an individual.

Box 3. Example: Project X develops project related resilience measure

Project X has used existing experience and a series of structured qualitative enquiries to identify a Theory of Change. They have identified increasing unpredictability of rain as a major cause of shock and stress. A combination of project inputs have been designed to address this:



Theory of change (ToC): a combination of adopting a drought resilient crop, using micro-irrigation, family membership of a saving group and making use of weather forecasting for deciding when to plant constitutes improved resilience due to the project, which will enable well-being to be maintained in a drought year.

Building on focus group discussions and pilot experience with the project activities, Project X decides to use five resilience indicators that are closely linked to the outputs of the project and can be easily surveyed by asking ‘yes/no’ questions of beneficiaries. It can therefore count the number of beneficiaries that are:

1. Growing one or more drought resistant crop on > ¼ ha for > 2 years
2. Using micro-irrigation on > 1/10 ha
3. Have used a weather forecast in last 2 years to decide when to plant
4. A family member in a savings group
5. Current savings > \$20

Focus group discussions by Project X suggest that the combination of indicators may be important in conferring resilience. It also wants to avoid the possibility of double counting if the same beneficiary fulfils more than one indicator. Project X therefore decides to create a project specific composite resilience index, and as it doesn’t have information on which is most important in conferring resilience it decides to weight each equally. It therefore assigns a score of one to each indicator satisfied and zero to any not satisfied and adds these together:

Indicator	Yes	No
1. Adopted one drought resistant crop on > ¼ ha	1	0
2. Using micro-irrigation > 1/10 ha	1	0
3. Have used a weather forecast in last 2 years to decide when to plant	1	0
4. A family member in a savings group	1	0
5. Current savings > \$20	1	0
Total project attributable⁸ resilience score	0-5	

Project X has therefore produced a single measure of predicted resilience, with a range of 0-5, that is closely linked to the changes it is promoting as a project. How this resilience score is used to calculate KPI 4 will be explained in following sections.

⁸ Assigning the degree of attribution is discussed in section 8

Different types of indicators

Indicators are often considered to be either qualitative or quantitative. However, in practice this distinction may be somewhat artificial. Household surveys or focus groups may ask questions that seek to elicit perceptions/opinions from beneficiaries. These are usually considered as generating qualitative data/information. However, a project might convert the qualitative responses to such questions into quantitative data for analysis. For example, beneficiaries may be asked whether they think their new crop combination is significantly more, slightly more, the same, slightly less or significantly less drought resistant than the traditional combination. These answers can be used to assign scores (e.g. from 1-5) to beneficiaries, which can be manipulated quantitatively.

Quantitative indicators, whether measured directly or derived from qualitative information, can be of three types:

1. **Binary**, usually where the answer is yes or no, and a score of 0 or 1 is assigned according to whether or not a beneficiary meets a particular criterion.
2. **Categorical or score based**, based on assigning a beneficiary a score (e.g. 0-3 or 0-5) representing a category or level of resilience (e.g. low, moderate, high). Score-based indicators are discussed in more detail below.
3. **Continuous**, based on measurement of a continuous variable such as household income, time to recover from a previous shock, etc.

All of the above types of indicator can be used to track changes in resilience. In practice, a project may use a diverse mixture of these indicators, all of which can be used to indicate whether an individual has become more or less resilient over time. However, if a project seeks to combine different indicators into one or more composite indices, there are a number of issues that need to be considered, as discussed below.

Individual indicators versus composite indices

A project will need to decide whether it will use composite indices, constructed by aggregating individual indicators, or individual, disaggregated indicators. The options with respect to aggregation are as follows:

- A. **Do not aggregate, and use a number of individual indicators**, each representing a different aspect of resilience that is relevant to the project, which are measured and recorded separately for each individual sampled.
- B. **Develop several composite indices**, each perhaps representing a different *dimension* of resilience that is relevant to the project, e.g. income & food access, safety nets, access to services, adaptive capacity, etc. (Box 3). See Box 4 for a discussion of the construction of composite indices.
- C. **Develop a single composite index**, combining all the elements of resilience that are relevant to the project. This may involve combining individual indicators or a number of already composite indicators. See Box 4 for a discussion of the construction of composite indices.

Where a project employs one or more composite indices, it is strongly recommended that the disaggregated data representing the individual constituent indicators are preserved. This enables the relative importance of individual indicators and the factors they represent to be interrogated, which is important for understanding how and why resilience has changed. This is vital both for learning and for assessing the contribution of the project to individual measured changes in resilience.

Box 4. Constructing and using composite indices

Where a project uses one or more composite indices it may be necessary to aggregate a number of different types of indicator (e.g. qualitative, quantitative, continuous, binary, etc.). This will require the conversion of all the indicators to be aggregated into a common format. This may be achieved in either of the following ways:

1. Convert to scores, e.g. 1-3 or 1-5

Conversion of indicators into discreet scores means that a composite index can be constructed by adding or averaging scores across its constituent indicators. Conversion to scores can be carried out as follows for different types of indicators:

- **Categorical indicators** can be created from qualitative information by associating different answers to survey questions with different scores. For example, a survey might ask beneficiaries how well they think they would cope with a drought of a particular severity if it occurred within the next few months, and score them from 1-5 based on which of 5 options they gave as an answer. The horizontal axis on an H-form can be divided into a number of equal divisions, and scores assigned based on the division into which a beneficiary's answer falls.
- **Binary indicators** can be given a score of 1 or 0 and combined into composite indices as in the Project X example in Box 3 above.
- **Continuous variables** can be converted into scores by dividing the actual or possible range of a variable into a number of divisions (e.g. 5). A beneficiary will then be assigned a score (e.g. 1-5) based on the value of the variable they report (e.g. household or individual income, value of certain assets, time spent collecting water etc.). The divisions used for a continuous variable should be the same for baseline and subsequent sampling.

The above techniques mean that qualitative, binary and continuous indicators can all be converted into scores, using a common scoring system (e.g. all values are converted into a score from 0-5), essentially becoming categorical indicators. These can then be summed or averaged to create the composite index. Depending on the nature of the individual indicators used to construct the index, the resulting scores might be associated with levels of resilience (e.g. very low, low, moderate, high, very high).

2. Convert into a value within a continuous range, e.g. 0-1

Another way of harmonizing different indicators is to standardize them so that they all represent a range of values from, for example, 0-1 or 0-100. This can be done by dividing indicator values (as associated with different beneficiaries) by the maximum value in the range (to yield a range from 0-1). This maximum value might be a maximum possible value (e.g. number of days in a year or season when a beneficiary had two meals), or a subjective reference value (e.g. income of wealthiest household). This technique works well for continuous variables and can also be applied to categorical or score based indicators or composite indices constructed from these categorical indicators.

Once all the relevant indicators have been standardized to the same range, they can be summed or averaged. Depending on the nature of the individual indicators, thresholds might be defined above or below which beneficiaries are assessed as resilient.

Weighting indicators within a composite index

If composite indices are to be used, project staff will need to determine how their constituent indicators

should be weighted, based on their relative importance. This identification of weights might involve statistical assessment, based on the strength of the correlation between individual resilience indicators and the impact indicators that are relevant to the project. However, weights are more usually assigned on a subjective basis according to the perceptions of beneficiaries, project staff, or other stakeholders or experts. No/equal weighting might be applied where there are no strong grounds for judging some indicators to be more important than others. Multiple indicators that are strongly related to each other will represent a de facto weighting in favour of the factor(s) they measure: in the example in Box 3 all five indicators are given equal weights, but there are two indicators related to savings, meaning that savings will be weighted as more important than the factors represented by the other indicators. Project staff should be aware of such issues and their potential implications.

General considerations when developing indicators

The following general points should be kept in mind when developing indicators:

- a. For the purposes of reporting against KPI4 the indicators need to focus on those aspects of resilience **influenced by the project**, and not all the possible factors that might affect resilience. However, monitoring other aspects or dimensions of resilience not directly targeted by the project might be useful for understanding unexpected results (Step 5), and for understanding changes to the wider resilience context.
- b. For formal reporting, KPI4 only requires that indicators measure whether resilience has improved. Normally projects will have to decide what change in indicator score constitutes sufficient improvement to report against KPI4 (i.e. to say that resilience has increased) for a given indicator in a given context. This may involve estimating the change in numbers exceeding a specific threshold before and after the project. However, while collecting data for reporting against KPI4, projects may collect data that can be analysed in a range of ways for additional learning. For example, Project X counts the numbers crossing different resilience thresholds, but could also calculate average resilience scores before and after the project, and the (different) percentage improvements for males and females or for other types of beneficiary (see Box 6 below). All this information can be helpful for learning about project outcomes, in addition to reporting against KPI4.
- c. Different indicators might be appropriate for measuring changes in resilience for different groups of beneficiaries (e.g. differentiated by gender, livelihood, etc.). This does not preclude later aggregation to calculate overall numbers with improved resilience, or aggregation of numbers moving from one resilience category to another (e.g. medium to high).
- d. When aggregating numbers with improved resilience due to different overlapping components of a project, some thought is needed to avoid double counting.

- e. In the case of indicators based on continuous variables or categories, the crossing of a particular threshold may be required in order to say that resilience has actually improved. For example, a small increase in water availability may be insufficient to improve the resilience of cropping systems if it means that critical deficits are still experienced during critical periods. In this example, resilience might be said to have improved only if water availability exceeds a certain threshold, which might be measured in terms of quantity (e.g. if water is stored locally for irrigation) or duration (e.g. where water is made available during certain periods of deficit by releasing it from regional storage facilities such as dams).

Table 2 sets out the criteria for meeting Bronze, Silver and Gold standards in indicator development.

Table 2. Different standards for the identification and construction of indicators.

	Bronze	Silver	Gold
Type of indicator and evidence base	Indicators based on theory of change informed by key informants, as far as possible complemented with empirical evidence or participatory information from a representative sample of potential beneficiaries. Indicators may measure direction of travel only (e.g. subjective indicators that ask beneficiaries whether they are more or less vulnerable with respect to different factors).	Indicators based on a theory of change informed by either empirical evidence (e.g. previous experience in a similar context of the resilience outcome indicators being correlated with well-being impact) OR informed by robust participatory inquiry with representative samples of future beneficiaries.	Indicators based on a theory of change informed by either empirical evidence (e.g. previous experience in a similar context of the resilience outcome indicators being correlated with well-being impact) AND informed by robust participatory inquiry with representative samples of future beneficiaries.
Weighting of indicators	Project uses unweighted individual/disaggregated indicators, composite indices whose constituent indicators are assigned weights based on judgment of project staff, or combination of both.	Project uses indicators (either disaggregated or combined into composite index/indices) with weightings determined using participatory methods, based on wider range of beneficiary and/or expert opinion.	More quantitative approach to assigning of weights, e.g. through statistical assessment of proportion of impacts (reduced losses, improved well-being) predicted by each indicator and/or robust evidence from participatory enquiry.
Thresholds and relationships between indicators	Indicators are assumed to be independent and incremental (i.e. higher score means more resilience; improvement in larger number of indicators means bigger improvement in resilience).	Evidence that project has considered importance of thresholds and coupling between indicators (e.g. improvement required in multiple related indicators for resilience to be said to have improved).	As Silver, with empirical evidence used to identify thresholds and sets of coupled indicators. E.g. past case studies, statistical analysis.

5. Establish how to identify unexpected consequences

Project M&E systems should include mechanisms for identifying and tracking potential ‘unintended consequences’ of the project on resilience (Box 5). At the very least these should include provision

for open-ended qualitative questioning of beneficiaries at regular intervals, e.g. using key informants to ask if any unintended consequences have been noticed.

Unintended consequences are often discovered at the evaluation stage. However it is far preferable to identify, mitigate and monitor any unintended consequences from early on.

If some **potential unintended consequences** are identified in advance these might be tracked using additional indicators. For a project to demonstrate increased resilience as required by KPI4, improvements in indicators associated with targeted aspects of resilience would need to be accompanied by evidence that the project had not resulted in a deterioration in other aspects of resilience due to ‘unintended consequences’. This might be achieved by using ‘unintended consequences’ indicators or by obtaining beneficiary feedback on the presence or absence, nature and extent of any unintended consequences (or a combination of both).

Box 5. Example – potential unintended consequence of Project X

Project X is promoting both more resilient food crop production and participation in savings groups. A potential unintended consequence was identified in project planning, namely that households might sell small amounts of stored crops on a fortnightly basis in order to meet the savings requirements of the savings groups, leading to a reduction in level of crop stored, and therefore undermine resilience.

Therefore Project X introduced an additional factor into its monitoring – the amount of crop remaining in storage at the start of the hungry period. This enables Project X to track whether saving groups participants end up with less grain in store and factor in this potential unintended consequence into its programming.

Treatment of unintended consequences for bronze, silver and gold standards is summarised in Table 3.

Table 3. Different standards for addressing unexpected consequences and confounding factors

	Bronze	Silver	Gold
Unintended consequences	Unintended consequences discussed and (where identified) described in project documentation and assessed using qualitative assessments based on beneficiary feedback (e.g. key informants).	As Bronze, with identified potential unintended consequences tracked through dedicated questions integrated into survey forms/ questionnaires.	As silver, with unintended consequences tracked using indicators relating to aspects of resilience that are not targeted by the project but that might be adversely affected by the project.

6. Develop a sampling methodology

Most projects will have identified beneficiaries at the design stage. These may be people living in the geographical area covered by the project, particular types of individual or household, or people involved in one or more specific project activities. Projects need to know the number of their target beneficiaries and they will need to identify a sample of their beneficiaries at intervals in order to measure changes in resilience indicators over time.

Projects do not need to survey every individual, but need to make sure the sample chosen is representative and of sufficient size that results may be scaled up to the beneficiary population as a whole with the required level of confidence. Projects might sample a random cross-section of the beneficiary population, meaning that each sample will consist of a different set of individuals or households. Alternatively, they might choose to conduct longitudinal or panel surveys, in which the same individuals or households are tracked over time. Projects might combine these two approaches, for example using smaller panel surveys to triangulate the results of larger cross-sectional surveys. The findings of the former might be used to extract more information from the latter, for example through observations on how large-scale changes in numbers in different resilience categories relate to changes in resilience occurring at smaller scales. Projects should seek statistical advice on sample frames and sample numbers, as well as on the use of different sampling techniques used for large-scale household or individual surveys, panel surveys that track the same individuals over time, and/or focus group approaches that collect more qualitative data. The sampling approach selected, including the sample size calculation, will have implications for how the number of people with improved resilience is counted, as discussed below in Step 8.

Projects will need to identify how frequently they will sample beneficiaries to measure changes in resilience using the indicators developed under Step 4. At the very least, projects will need to gather baseline data before or very close to the start of the project, and a further set of data at the end of the project for comparison with the baseline data. However, more frequent sampling during a project's lifetime may be desirable, where resilience indicators are expected to exhibit changes on sufficiently rapid timescales. Such sampling might be done annually.

Continuing to monitor beneficiaries after the project has ended (ex-post) is useful to test whether any improvements in resilience have been sustained, and to examine the longer-term influence of a project. It is conceivable that some changes in resilience may not be apparent until after a project has ended, making ex-post monitoring and evaluation essential.

Where resilience indicators are to be compared with impact indicators⁹, the latter might need to be measured after a project has ended because of the timescales associated with the evolution and impact periods of some climate stresses and shocks. Table 3 provides guidance on sampling intervals for different measurement standards.

Quantitative measurement of KPI4 should be complemented by some qualitative explanatory inquiry on stakeholder perceptions - to understand the reasons why changes in the predicted elements of resilience did or did not actually contribute to improved well-being and why.

Measurement of resilience indicators should ensure that data can be disaggregated so that results may be examined for different beneficiary categories. At the very least, data should be disaggregated by gender. However, there may be systematic differences in resilience, and in the extent to which a project improves resilience, between other categories of beneficiary. These categories might be based on age, location, livelihood, or other social, economic or cultural differences (Table 4). However, projects should note that if they wish to analyse and present data

⁹ The use of impact indicators to validate resilience indicators (e.g. through statistical correlations to determine how much variation in impact indicators is predicted by resilience indicators) is outside the scope of this guidance. However, this is addressed in the BRACED *Guidance on Indicators and Baselines*.

disaggregated beyond gender, this is likely to require significantly larger sample sizes. Statistical advice should be sought on sample sizes.

Table 4. Different standards for sampling

	Bronze	Silver	Gold
Timing	Baseline and end of project where beneficiaries need to be surveyed; annually for any indicators based on secondary data collected by e.g. national agencies.	As Bronze, with one ex-post measurement/evaluation.	As Bronze, with multiple ex-post measurements/evaluations.
Disaggregation ¹⁰	Gender	Gender + other pre-determined classes	A range treated as independent 'explanatory' variables
Type of sampling	Random samples of beneficiary populations (the same individuals are not tracked over time), or panel surveys (the same individuals are tracked over time), complemented with qualitative method/framework for scaling up to beneficiary population as a whole (e.g. persuasive narrative with error ranges estimated).	Random samples of beneficiary population that are of sufficient size to be statistically representative of beneficiary population, 'triangulated' or 'calibrated' using small-scale panel surveys, to deliver more nuanced information on how resilience is changing.	Large-scale panel surveys that are of sufficient size to be statistically representative of beneficiary populations.

7. Calculate numbers of individuals with improved resilience as measured by indicators relevant to project activities and outputs

This step describes a number of approaches for calculating the numbers of people with improved resilience as measured by project-relevant indicators. These indicators measure changes in aspects of resilience targeted by or potentially influenced by the project (these aspects of resilience may also be influenced by factors outside the project). They will include indicators intended to capture unexpected consequences as described in Step 5. The resilience of some individuals may increase, while that of others decreases. What is being reported in KPI4 is the net change (i.e. numbers with improved resilience minus numbers with worsened resilience).

The approach selected for calculating the numbers of people with improved resilience will depend on the sampling methods and types of indicators used. Different ways of calculating numbers with improved resilience will be needed depending on whether data are collected using panel/

¹⁰ With a greater level of disaggregation the survey sample size will need to be larger – statistical advice should be sought.

longitudinal studies that sample the same individuals over time, or random sampling that involves different individuals for each sampling time. The method of calculation will need to be modified further depending on whether the project employs multiple indicators, multiple composite indices, or a single composite index. The calculation of numbers with improved resilience for different sampling methods, and different approaches to aggregation, is discussed below.

This step does not address the extent to which the measured changes can be attributed to the project; this issue is addressed below in Step 9.

1. Panel data / longitudinal studies that sample the same individuals

Where the same individuals are sampled over time, it is possible to look at how the resilience of these 'representative' individuals changes between two sampling period. Given a sufficient sample size, the proportion of sampled individuals with improved resilience can be assumed to represent the proportion of beneficiaries with improved resilience, allowing absolute numbers with improved resilience to be estimated. This process can be repeated for different groups of beneficiaries such as men, women, different livelihood groups or age cohorts, etc. As indicated in Step 7 above, statistical advice should be sought on appropriate sample sizes, with larger samples being required where data are to be disaggregated.

Different approaches will be required for the analysis of panel data depending on the nature of the indicators used, as discussed below.

A. Single indicator or composite index

Where a single composite index is used to measure resilience, KPI4 is calculated from the number or people in the sample showing a sufficient change (e.g. above a certain threshold) in indicator value or index score in the desired direction, minus the number showing a change in score in the opposite direction.

B. Multiple composite indices or small number of individual indicators

Where more than one composite index or a small number (e.g. <5) of individual indicators is used, the number of people in the sample with improved resilience might be the number showing an improvement in one or more index/indicator and no deterioration in the others, minus the number showing a deterioration in one or more index/indicator and no improvement in the others. Individuals who show a mixture of improvement in some indices/indicators and deterioration in others should be viewed as having neither improved or reduced their resilience, and should not be included in the calculation. However, their numbers should be recorded.

This methodology might be refined where there are grounds for arguing that deterioration in some indicators/indices is outweighed by an improvement in others. This might be based on the numbers of indicators showing improvement/deterioration, or on the relative importance of different indices/indicators. These grounds will depend strongly on context and the nature of the indicators used.

C. Multiple disaggregated indicators (large number)

Where a large number (e.g. ≥ 5) of individual indicators is used, a practical approach to establishing whether resilience has improved for a beneficiary is to examine whether improvements are seen in a minimum number of indicators X, with deterioration in a maximum number of indicators Y (accounting for any relevant thresholds that must be crossed for resilience to be said to have increased). The values of X and Y should be set by project staff, based on their understanding of the aspects of resilience represented by the indicators. If the factors represented by the indicators are such that resilience improves incrementally for each indicator that shows an improvement, then (project-relevant) resilience may be said to have improved as long as X is greater than Y.

However, the different factors that contribute to resilience might interact in a non-linear manner, meaning that indicators do not represent incremental improvements in resilience. In such cases, X might be significantly greater than Y, and a necessary condition for improved resilience might be that a set of 'core' indicators show an improvement or remain stable. These core indicators might be related to, or 'coupled' with each other in such a way that an improvement in one indicator only translates into improved resilience if it is paired with improvement or stability in one or more other indicators. For example, an improvement in a beneficiary's access to a certain resource (e.g. grazing land) might only improve their resilience if the quality of that resource is maintained (e.g. sufficient pasture is available) and their access does not bring them into conflict with other users (e.g. conflicts over access/use are rare).

Whether indicators can be treated as demonstrating incremental improvements in resilience, or whether more complex relationships between indicators mean that improvements must be seen in a core group of indicators, must be judged by project M&E staff. Once staff have considered these context-specific factors to determine how to define improvements and deteriorations in resilience, they can calculate the net number of beneficiaries with improved resilience in a similar manner to A and B.

2. Representative cross-sectional surveys

A succession of random representative cross-sectional surveys, collecting resilience indicator information from different people/households at different points in the project cycle, can tell us how many people are at a certain level of resilience or within a certain resilience category (e.g. low, moderate, high) at a given point in time, and therefore how overall numbers in these categories change over time. However, they do not allow us to track changes in the resilience of particular individuals over time as we would in a longitudinal study. Neither can we add changes in the numbers of people in different categories to calculate numbers with increased or decreased resilience across the entire range of categories, due to uncertainties about the way people move between categories. For example, if the number of people in the low resilience category decreases by 100 and the number of people in the high resilience category increases by 100, is this the result of 100 people moving directly from the low to high category, or of 100 people moving from the low to moderate category, and a further 100 moving from the moderate to high category? Numbers with increased resilience would be twice as great in the latter case.

The most practical way of measuring numbers with improved resilience through the use of periodic random sampling is to define a single threshold and estimate the net change in numbers above this threshold between two sampling periods. This will be the number with improved resilience that can be used for reporting against KPI4. This approach is illustrated for Project X in Box 6.

This 'net change' in resilience may mask significant changes in individual resilience:

- If some beneficiaries fall below the threshold as others rise above it, project staff may want to estimate how many beneficiaries have crossed the threshold in each direction – not just the 'net' number;
- Project staff may want to know by how much individual beneficiaries have improved (or reduced) their resilience, not just whether, and many, beneficiaries have crossed a single, fixed threshold.¹¹

Beneficiaries may experience improvement or deterioration in resilience without crossing the threshold, meaning that the use of a single threshold is likely to underestimate changes in resilience. Longitudinal studies are much better at revealing nuances of change over time for different categories of beneficiary.

3. Measuring 'direction of travel' in a sample survey

Within a survey, in addition to collecting data representing the values of resilience indicators at a particular point in time, it is possible to ask supplementary questions regarding whether a particular indicator is increasing, staying the same or decreasing (e.g. has the amount of money you have saved increased, decreased or stayed the same since this time last year?). This type of question is particularly useful for KPI4, as it provides direct information on the numbers who report improvements in resilience and in resilience indicators. This 'direction of travel' information can be used to show perceived changes in resilience in a single survey, or to triangulate resilience indicator data from a series of surveys at different times – perhaps providing an indication of how many beneficiaries are becoming more resilient, staying the same, or becoming less resilient, to help explain the net number crossing a threshold as described above.

Results from 'direction of travel' questions can also be used to estimate KPI4 directly. However, project staff will have greater confidence in their measurement of resilience where questions on the 'direction of travel' are used to complement quantitative indicators such as those described above. Used in isolation, 'direction of travel' information would qualify a project for the bronze rating in terms of calculating changes in resilience. If used in isolation, a context specific decision would need to be made on how many indicators would need to move in the 'right' direction to indicate an improvement in resilience as relevant to the project, and thus be counted for KPI4.

¹¹ There may also be a danger of concentrating on the 'quick wins' just below the threshold, which are easy to get above it, rather than the more intractable vulnerable categorise.

Box 6. Example - Project X calculates numbers of individuals with improved resilience as measured by indicators relevant to project activities and outputs, represented by a scoring system

We saw in Box 3 how Project X had constructed an individual’s resilience score ranging from 0-5. Project X, following statistical advice, conducted a representative sample survey at the beginning and end of the project of its 10,000 beneficiaries. From these surveys it was able to estimate the number of its beneficiaries in each resilience score category at the baseline and end of the project:

Resilience score	Number of individuals			
	Baseline		End line	
	Female	Male	Female	Male
0	2,000	1,000	500	500
1	2,000	1,000	500	500
2	1,000	1,000	1,000	1,000
3	250	750	2,000	1,000
4	250	750	1,000	1,000
5			500	500
Total	5,500	4,500	5,500	4,500

Project X decides that to be considered significantly resilient an individual should have a resilience score of three or more. It therefore calculates that at the baseline only 500 females and 1,500 males of its 10,000 beneficiaries were above this threshold. However by the end of the project 3,500 females and 2,500 males are above the threshold. Therefore Project X estimates that 3,000 females and 1,000 males had improved resilience from below to above the threshold measured by its resilience score. Estimates of attribution of this change to Project X are discussed in the next section.

Note: In addition to just counting the numbers crossing a resilience threshold, the figures can tell us much other interesting information. For instance the average scores at the baseline and end line can be calculated and the percentage increase for females and males calculated.

4. Estimating number of individuals from household surveys

An issue for many projects will be how to calculate KPI4 resilience data for individuals using data from surveys conducted at the level of the household.

There will usually need to be a number of context specific assumptions made when estimating individual numbers from household survey data. Some of these assumptions can be informed by questions in the household survey – such as the numbers in the family, ages, sexes etc. Some other assumptions will require qualitative enquiry and perhaps some detailed intra-household investigation.

At the most basic (bronze) level, if a household reports a change in resilience, information on household size and composition can be used to estimate numbers with improved resilience. It is important to estimate numbers and sexes from the actual sample households showing improved resilience – rather than multiplying up from the average household composition across the whole area – as households with increased resilience could be bigger or smaller, or with more or fewer beneficiaries of a particular type (e.g. female) than the average.

At the next level (silver), the calculations for bronze would be complemented with qualitative information on how different resilience indicators affect different household members. For example, it might be found that only women are involved in savings groups, and the resilience benefits from their participation only benefit the woman involved and their pre-school aged children. Therefore only these would be counted in relation to this indicator. In another example, a safety net might comprise a school feeding programme for children at primary school in times of shock. Qualitative inquiry might be required to assess whether the benefits from this also extended to other family members (more family food for everyone else) or not – and the calculation done accordingly. In yet another context it might be found that improved household level resilience indicators affect all household members more or less equally, and therefore the estimates made at the bronze level still hold true – but with stronger supporting evidence).

At the gold level some additional intra-household individual quantitative data collection and analysis would be used to track actual expression of resilience indicators at the individual level – preferably in relation to actual shocks and stresses.

Table 5. Different standards for calculation of numbers with improved resilience

	Bronze	Silver	Gold
Calculation method	<p>Change in number of people above a certain resilience threshold (e.g. threshold between low and moderate resilience or other threshold value in an indicator or composite index).</p> <p>OR</p> <p>Numbers of people reporting improved resilience since a specified time in the past, in surveys based on subjective perceptions of beneficiaries.</p> <p>(Cross-sectional surveys)</p>	<p>Numbers of people showing change in direction of improved resilience in a single composite index.</p> <p>OR</p> <p>Numbers of people showing change in direction of improved resilience in multiple disaggregated indicators, without significant change in direction of decreased resilience in other indicators (e.g. more indicators show increase than show decrease)</p> <p>Both above should be evaluated against perception surveys as described under Bronze.</p> <p>(Panel surveys)</p>	<p>Panel survey: As Silver but with any resilience thresholds or coupling between indicators identified, so that resilience is only defined as ‘improved’ where these thresholds are crossed, or where improvements or stability are seen in all ‘coupled’ indicators (see main text). (Panel surveys)</p> <p>Cross-sectional survey: As Bronze, with cross-sectional survey ‘calibrated’ using a smaller panel survey so to add weight to perception survey results, or to allow movement between multiple categories/levels of resilience to be estimated/extrapolated.</p>

Calculation of individual numbers from household survey data	Simple multiplication from numbers and sexes in households exhibiting increased resilience indicators	As bronze, but numbers adjusted or ratified by qualitative intra-household information	Intra-household data either tracked individually (e.g. in panel survey) or overall numbers adjusted through quantitative intra-household data collection and analysis.

8. Attribution - estimate numbers with improved resilience as a result of the project

Once the number of people¹² with improved resilience based on project-relevant indicators has been calculated (Step 7), the extent to which such improvements can be attributed to the project – directly or indirectly - needs to be addressed. At the very least this should consist of a convincing narrative that links measured changes in resilience to a project’s theory of change. This should be based at least in part on participatory methods using beneficiary perceptions and feedback that address why measured changes in resilience as represented by the indicators developed under Step 3 did or did not occur.

A (hypothetical) **counterfactual scenario** could be presented describing the situation that would be expected to pertain if the project had not been implemented. This might simply compare the situation before and after project intervention(s), with the situation before the project representing the counterfactual. However, this needs very careful interpretation – as so many other elements are likely to be changing (including the presence or absence of climate shocks over a particular period), and so it is difficult to attribute differences in resilience as represented by relevant indicators purely to project interventions. In such a case, an argument should be presented as to why resilience would not have improved anyway, for example due to other factors or processes outside of the project context (e.g. government investment, changes in the wide economic context, and improvement in climatic conditions, etc.).

When a project is introduced in phases across an area it may be possible to compare the situation (and the resilience as represented by relevant indicators) of beneficiaries at different stages of the intervention. Comparisons can be made between beneficiaries at earlier stages and those at later stages, with the former representing a type of counterfactual.

Some projects might employ a more experimental approach such as that of a randomised control trial (RCT). Control groups should have similar characteristics to beneficiaries and be exposed to the same stresses and shocks. Assessment of the resilience of control groups might involve qualitative narratives bolstered by secondary data/evidence, or the tracking of resilience among control groups using similar indicators to those applied to the beneficiaries. Panel surveys might also be employed, with projects seeking specialist advice on how to conduct these for such a purpose. Stern et al. (2012) conclude that only some 5% of development programmes are suitable for RCTs, although such approaches are increasingly popular in the field of development (see Box 7 for some key

¹² Disaggregated by gender and possibly other categories

references on the use of control groups and RCTs). It should be stressed that most projects are not expected to use control groups. Rather, this is an option whose feasibility can be explored if it is viewed by project staff as potentially realistic and useful, and ways of addressing any practical and ethical challenges can be identified (see Box 7 for further discussion of these issues).

Box 7. Key references on the use of control groups and randomised control trials

Barahona, C. 2010. *Randomised Control Trials for the Impact Evaluation of Development Initiatives: A Statistician's Point of View*. ILAC Working Paper 13.

Gilbert, N. 2013. International aid projects come under the microscope: Clinical-research techniques deployed to assess effectiveness of aid initiatives. *Nature* 493, 462-463.

Humphreys, M., de la Sierra, R. S. and van der Windt, P. 2012. *Social and Economic Impacts of Tuungane Final Report on the Effects of a Community Driven Reconstruction Program in Eastern Democratic Republic of Congo*. Columbia University.

Stern, E., Stame, N., Mayne, J., Forss, K., Davies, R. and Befani, B. 2012. *Broadening the Range of Designs and Methods for Impact Evaluations: Report of a study commissioned by the Department for International Monitoring & Evaluation*. DFID Working Paper 38.

Using some or all of the above methods, project staff should estimate what proportion of the people with improved resilience (as measured by the project-relevant indicators) can be said to have experienced improved resilience **as a result of the project**. For example, what is the difference in the percentage of people with improved resilience based on these indicators in target and comparison groups? What proportion of people providing feedback attribute improved resilience (partly or wholly) to assistance provided by the project? Some projects might choose to survey beneficiaries to calculate the level of contribution from a project. This might be done by asking beneficiaries whether the project contributed 'not at all', 'a little', 'somewhat', 'a lot', or 'exclusively' to any measured improvements in resilience. Other projects might seek to express the contribution of a project in percentage terms, as illustrated in the example Box 8 below.

Attribution-related questions such as those identified above should be built into any relevant questionnaires, survey forms and reporting templates. There may need to be some intra-household adjustment (or verification) of household survey data as described in the preceding section and illustrated in the example in Box 8.

Of course, any deterioration in resilience resulting from the project should also be addressed in a similar manner, based on the main project-relevant indicators and any indicators designed to capture unintended outcomes.

The information derived from such questions, or from comparisons with control groups, can be used to adjust the overall number with increased resilience as calculated in Step 7, to provide a figure for numbers with increased resilience that can be attributed in whole or in part to the project.

Box 8. Example – Project X looks at attribution

Project X has already calculated that a net figure of 3,000 females and 1,000 males have increased resilience as measured by its project specific index. However it is aware that other NGOs and the government are also working on similar activities in the same area (introducing drought resistant crops, savings groups etc.). Project X estimates that it is the biggest intervention in these sectors and that about 50% of the change might be attributable to them, and 50% to interventions by other organisations. To check this it also organises a number of focus groups in the area to discuss the changes (e.g. crop adoption, saving group participation etc.) and what has motivated individuals to change their behaviour. The focus groups confirm that in about 50% of cases, Project X was the main or only instigator of change, whereas in the remaining 50% other organisations could claim the credit. The focus groups also concluded that, although female resilience had generally benefitted more from the interventions, this hadn't been disproportionately due to the activities of Project X than the other actors, and therefore the same attribution % should apply to both males and females.

Therefore project X decided that it could claim 50% of the credit for increased resilience for both the females and males. It therefore reported that while 3,000 females and 1,000 males had increased measured resilience, of these, 1,500 of the females and 500 of the males were estimated to be mainly due to its project activities.

Table 6 details the different standards for addressing project contribution to improved resilience.

Table 6. Different standards for addressing attribution.

	Bronze	Silver	Gold
Attribution narrative	Qualitative explanation of how & why resilience has changed by project staff	Participatory enquiry based explanation of how and why resilience has changed. Include those who failed to benefit.	Participatory enquiry based explanation complemented by other evidence, e.g. timing of changes in factors/processes represented by indicators in relation to project activities/ outputs. Include those who failed to benefit
Assessment of contribution	Project 'contributed to' improved resilience of X number of people	Qualitative description of extent to which project contributed, e.g. significant contribution, one of several factors, resilience would not have been improved without project; describe for different groups of beneficiaries	Quantitative characterisation that indicates the % of the total numbers with improved resilience that can be attributed to the project and/or the degree of change that can be attributed to the project.
Counter-factual	Before/after	Use of phased intervention approach to examine differences in resilience (and if possible impacts) across groups at different levels of intervention for different sampling periods.	Some experimental or quasi-experimental design (e.g. comparison populations, randomised control trial type methodology).

9. Report numbers with improved resilience as a result of project support (KPI4)

To report against KPI4 a project needs to provide a figure for the **number of people whose resilience has been improved as a result of project support (disaggregated by gender)**.

The number reported is the number with improved resilience linked to the project (numbers calculated in Step 7 and adjusted as described in Step 8) minus the number with reduced resilience linked to the project as a result of unintended consequences (Step 5).

Along with this headline number, it may be useful (for evaluation and learning at both the project and programme level) to report other information. Some projects might disaggregate their numbers based on categories other than gender (e.g. age, livelihood, location, etc.¹³), and add comparative information on which categories have changed most or least. This could be backed-up by explanatory information from qualitative methods.

Where a project has developed methods for measuring the degree of change in resilience (e.g. based on a simple or more complex scale), numbers of people moving from one category of resilience to another, or whose resilience has changed by more than X points, might be reported. It may also be interesting to look at the individual indicators that make up any composite indices. For example, which indicators have contributed most and least to the measured changes in resilience? This may yield information on which component of a complex project has been most effective in building resilience.

A description might also be given of those in the target area who failed to benefit from the project, with an explanation as to why this was the case.

Reporting of KPI4 should also be accompanied by some contextual information detailing how factors driving resilience that are not related to the project are changing.

Table 7 summarises the KPI4 reporting requirements for bronze, silver and gold standards.

Table 7. Different standards for reporting against KPI4

	Bronze	Silver	Gold
Headline indicator	Number	Number	Number
Categories of resilience	Improved, same, deteriorated	A simple scale	A more complex scale with the ability to divide into explanatory variables
Disaggregation	Gender	Gender + number of pre-determined categories	Gender + other categories that have been found to be associated with, systematic, statistically significant differences in indicators/scores, based on quantitative

¹³ However it should be noted that this may require increased sample size.

			assessment of indicator data
Those failing to benefit	Not required	Identify those unable to benefit from the project in area housing target population.	Quantify those unable to benefit from the project (i.e. how many people); how has their resilience changed (qualitative description or tracking using equivalent/ comparable indicators to those used for beneficiaries)
Characterisation of wider resilience context	Qualitative description by project staff of process and trends influencing resilience at large (i.e. outside of project context)	Estimate direction of change for processes and trends influencing resilience at large (i.e. outside project context)	Quantitative description of processes and trends influencing resilience at large (i.e. outside project context) with narrative of how beneficiaries' experiences differ from wider context (e.g. drawing on results of surveys of control populations).