Darwin Initiative Capability & Capacity Annual Report

To be completed with reference to the "Project Reporting Information Note": (https://www.darwininitiative.org.uk/resources/information-notes/).

It is expected that this report will be a **maximum of 20 pages** in length, excluding annexes)

Submission Deadline: 30th April 2024

Submit to: BCF-Reports@niras.com including your project ref in the subject line

Darwin Initiative Project Information

Project reference	DARCC018
Project title	Growing Indonesian Genomics
Country/ies	Indonesia
Lead Partner	RBG Kew
Project partner(s)	Badan Riset Inovasi Nasional (BRIN)
Darwin Initiative grant value	£125,012
Start/end dates of project	April 2023 – March 2024 (- Aug change request submitted)
Reporting period (e.g. Apr 2023 – Mar 2024) and number (e.g. Annual Report 1, 2, 3)	April 2023 – March 2024 Final Report
Project Leader name	Liam [redacted]
Project website/blog/social media	https://liamtrethowan.com/2024/04/26/gig-2/ https://liamtrethowan.com/2023/10/26/growing-indonesian-genomics/
Report author(s) and date	Liam [redacted] 23/05/24

1. Project summary

Genomics is a powerful tool that can identify how resilient agriculture and biological diversity will be to a changing climate. Indonesia is an island nation with a huge diversity of crops and wild plant species at risk from rising temperatures and more frequent climate extremes. RBG Kew and BRIN here aim to build a cohort of Indonesian plant scientists who employ the latest genomics methods to determine and improve the resilience of the country's plant megadiversity to build food security. Kew's latest government funded (NERC/Newton Fund) collaborative project with Indonesian institutes, including Herbarium Bogoriense, ran from 2019-2022. Following discussions with Indonesian colleagues, during the NERC/Newton project, it was made clear that there is a need for qualified local scientists who can help prevent crops and species loss due to climate change.

The key reason why this project addresses national and international policy:

Although Indonesian researchers can sample their country's considerable genetic resources, those resources remain inaccessible without the ability to use the latest analytical methods (ITPGRFA; Nagoya; CBD 15, 16, 17). We plan to directly address this educational need for Indonesia's plant research community by providing genomics training to a gender equal cohort of participants (CBD article 12; NBSAP 19; SDGs 4, 5).

The skillsets to exploit the latest genomic techniques are rare in Indonesia. A recent study found that zero plant genomes had been sequenced in Indonesia, contributing to a pattern of limited contribution from the global south. There are generic online tutorials available to acquire genomic skills however in-person teaching by experts with experience closely related to the interests of participants is more efficient to accelerate the growth of genomic skills. Fast growth in genomic studies is required if we want to address the many pressing threats posed by anthropogenic/climate change upon Indonesian biodiversity. We therefore need many individuals who have the capability to carry out the bioinformatics that allow genomic data to be processed and analysed. This project aims to strengthen the capacity of Indonesian participants enabling them to access and use relevant genomic tools and to design and conduct studies using these tools to improve plant resilience to climate change.

2. Project stakeholders/ partners

Partners at BRIN selected all workshops participants based upon skillsets and need identified via participants current projects. MALE/FEMALE participants numbers ….

This is an ongoing collaboration with BRIN who the PI has been working closely with since 2016. We built a broad curriculum for the workshops to allow participants to select which content they wanted to focus upon which included building a wider curriculum beyond intial plans.

Triny Tresnawulan from the British embassy in Jakarta has been in contact with Kew frequently over the past 5 years and this was the case during this project including a workshop visit in March 2024.

3. Project progress

3.1 Progress in carrying out project Activities

During October 2023 **1.1a** Field breadfruit leaf sampling took place around Bogor and Purwodadi botanic garden. **1.1b** DNA was extracted and sent to selected company for sequencing. **1.2a** ONT minION sequencing carried out by instructors and participants. **2.1a** Theoretical lectures were prepared alongside **2.1b** practical teaching material and **2.1c** teaching data. **2.1d** Hardware and software (laptops) was setup and used by participants. **2.2a** Teaching resources were tweaked and improved during a collaborative session with participants of workshop 1.

3.1a First workshop participants were identified and selected dependent upon pre-agreed criteria. **3.1b** During the first workshop in Bogor relevant bioinformatic pipelines were taught using training data for both ONT and genome skimming data. **3.1c** Feedback gathered from participants and this used to improve materials/2nd workshop structure. **3.1d** The four participants analysed novel data from 1.2 post workshop successfully assembling chloroplast genomes.

3.2a Second workshop participants identified. **3.2b** Instructors/participants from cohort 1 prepared for workshop 2 with updated teaching materials. **3.2c** Second workshop in Bogor. Larger cohort learn and carry out the required bioinformatics for both ONT and genome skimming data. **2.2b/3.2d** Teaching resources improved during a collaborative session with participants of workshop 2 and made freely available.

4.1 A formal paper was decided to be the most desired form of action post workshop for the benefit of participant careers and annual targets.

3.2 Progress towards project Outputs

Output 1. Genomic data were generated from samples collected across the Javan rainfall gradient. We collected thirty-three samples; 16 from around Bogor (wet tropical) and 17 from Malang/Cibinong (seasonally dry) **1.1** specimens are currently stored in Bogor**.** Oxford Nanopore minION sequencing experiments were carried out to produce long reads for two breadfruit individuals **1.3.** Illumina short read sequencing **1.2** has been carried out by PT Genetika Science in Indonesia this is 30 X coverage for two individuals and 10 X coverage for 31 individuals. **2.1/2.2** teaching material were produced and edited for both workshops. **3.1/2** All 15 participants of the first workshop are capable of processing Illumina and minION genomic data for association studies and understand the rationales behind the analytical decisions. **4** costs-benefits of different sequencing approaches have been taught and this applied to participants current and planned projects. We scaled back much of the roadmapping work in favour of a wider syllabus as requested by partners during M&E.

3.3 Progress towards the project Outcome

We have achieved the Outcome of the project in that we aimed to have 'Scientists trained in applying cutting edge genomic techniques to enhance sustainable livelihoods and plant conservation.'. Our 15 participants are now working toward a manuscript with two high-quality breadfruit genomes with a preliminary analysis of genomic adaptation across the Javan drought gradient. This outcome is beyond what was originally envisaged.

3.4 Monitoring of assumptions

All of our key assumptions held up:
In-country access for instructors.
Participant availability.
Field access results in sequencing/genomic data available for analysis.
Sufficient internet access for data processing and teaching.
Teaching material adapted to the knowledge level and expectations of the participants
Sufficient time allowed for teaching and learning.

In some cases expectations were surpassed e.g. the conferencing facilities meant we could also have instructors join remotely when needed and we made and sequenced more breadfruit collections than originally planned.

3.5 Achievement of positive impact on biodiversity and poverty reduction

Our positive impact are primarily people-based as now participants are able to build their own genomics projects relevant to biodiversity conservation and agricultural resilience in Indonesia. We have also ensured the gender imbalance at higher levels of Indonesian science has not been repeated here with 9 female and 5 male participants. We have cemented these skills with additional hardware for participants and what wet resources are needed for their science to be at the cutting edge.

These projects could have multiple applications. They could tackle the identification of genes/alleles linked to resilience to drought and other stressors like pollution, diseases and temperature increases across a broad range of crops and wild plants, supporting crop breeding, species conservation and ecosystem restoration in a context of global change. The genomic skills learnt by participants can also be used for identification of illegally traded plant products, which will be extremely valuable given there are 33208 plant species CITES listed for Indonesia and accurate species identification via morphological studies often requires leaf, flower and fruit material that are rarely traded together. Such investigations will benefit communities that derive their livelihoods from plant growing or exploitation from the wild, and the population that rely upon food crops grown in Indonesia. They will also help NGOs, Universities and government agencies such as Balai Konservasi Sumber Daya Alam (BKSDA)

that are trying to clampdown on the wildlife trade and understand and limit current and future threats to rare species and whole ecosystems. This change is dependent upon the choices made by the participants in deciding who they choose to collaborate with and which research directions they choose to take. This agency that we have helped facilitate is the critical positive impact of the project.

4. Project support to the Conventions, Treaties or Agreements

The key reason why this project addresses national and international policy:
Although Indonesian researchers can sample their country's considerable genetic resources, those resources remain inaccessible without the ability to use the latest analytical methods (ITPGRFA; Nagoya; CBD 15, 16, 17). We have directly addressed this educational need for Indonesia's plant research community by providing genomics training to a gender equal cohort of participants (CBD article 12; NBSAP 19; SDGs 4, 5).
There are multiple supporting reasons why this project provides the first step to addressing national and international policy requirements:
New techniques taught allow important wild and crop plants that are at risk from climate change to be identified from a functional perspective e.g. they lack genes/alleles contributing to drought tolerance (CBD 8d, i; NBSAP 12; SDGs 13, 15). Conversely, this will help the identification and breeding of tolerant genotypes, which will enhance sustainability of communities by securing future yields and limit the risks of climate change driven hunger (SDGs 2, 11). Tolerant genotype identification will also inform decisions regarding species in or ex situ conservation and species choice for ecosystem restoration and agroforestry (SDG 15).
Genomic techniques also enable novel uses of crops and wild relatives to be examined (NBSAP 18).
Genomic studies can be scaled up to cover enough species to assess ecosystem resilience and likely changes to ecosystem functioning and associated services, such as watershed protection (NBSAP 14; SDG 6).
Participants have gained the initial genomic skills that are becoming part of the international toolkit to identify illegally traded species (CITES Stategic Vision 2021-2030 Goal 3).

5. Gender Equality and Social Inclusion (GESI)

Please quantify the proportion of women on the Project Board[1].	0.5
Please quantify the proportion of project partners that are led by women, or which have a senior leadership team consisting of at least 50% women[2].	1

GESI Scale	Description	Put X where you think your project is on the scale
Not yet sensitive	The GESI context may have been considered but the project isn't quite meeting the requirements of a 'sensitive' approach	
Sensitive	The GESI context has been considered and project activities take this into account in their	

[1] A Project Board has overall authority for the project, is accountable for its success or failure, and supports the senior project manager to successfully deliver the project.

[2] Partners that have formal governance role in the project, and a formal relationship with the project that may involve staff costs and/or budget management responsibilities.

	design and implementation. The project addresses basic needs and vulnerabilities of women and marginalised groups and the project will not contribute to or create further inequalities.	
Empowering	The project has all the characteristics of a 'sensitive' approach whilst also increasing equal access to assets, resources and capabilities for women and marginalised groups	X
Transformative	The project has all the characteristics of an 'empowering' approach whilst also addressing unequal power relationships and seeking institutional and societal change	

Given higher level Indonesian plant science is male dominated our project supported the skillsets of participants the majority 9/14 were female. We hope this is reflected in the future as more female participants become part of successful large-scale genomics projects both within Indonesia and without. For instance, the next large-scale Orchid genomics project will include female Indonesian collaborators and multiple large Kew-Indonesia genomics-based grant applications include female participants of the workshop.

6. Monitoring and evaluation

We carried out M&E throughout the timeline of the project. There were four key points where this was acted upon. Prior and post every both workshops. This led us to adapt teaching materials for both workshops to ensure a syllabus beyond what we initially envisaged ensuring that more topics were covered, and the legacy of the project was greater. Specifically, the first workshop had a greater focus upon long read sequencing with multiple wet labs using the ONT minION. In addition, participants wanted to add phylogenomics content which was also covered in depth. This meant the second workshop had a greater focus upon landscape genomics but as all participants of the first workshop were assisting/teaching they were able to take in the extra content. The wet lab skills taught in workshop one are set to be taught to workshop two participants post-project by the first round of participants, showing how well the skills have been cemented.

7. Lessons learnt

Workshop engagement was fantastic and the atmosphere of support and understanding was a pleasure to see. The amount of time it took to get Quotes from companies and Purchase Orders processed internally at Kew took longer than anticipated. Similar sequencing projects purchasing hardware and lab consumables should take that into account. This was not too great an issue but given the short project timeframe those pressures were greater.

8. Actions taken in response to previous reviews (if applicable)

Review comment 1:

The importance of training to strengthening the foundation for local genomics skills is mentioned within the application but this could be strengthened / expanded. The pathway from training in genomics to practical biodiversity conservation impact should be clearer.

Response 1: Biodiversity conservation need to understand which habitats and ecosystems are most at risk. Genomics offers us the toolset to understand which alleles are associated with climatic conditions we expect regions to be more exposed to in the future e.g. drought. Those regions with fewer species with these alleles can be expected to be less resilient to future

perturbations – this may lead to these regions being prioritised depending on conservation implementation strategy of the stakeholder.

Review comment 2:
The application assumes that after training, people would be able to apply the knowledge learned to further research either by the Government of Indonesia or foreign donors, but what measures or commitment are in place from the Research Center for Biosystematics and Evolutions (BRIN) to retain the trained staff?

Response 2: All participants are permanent BRIN staff and BRIN have committed to funding genomics annually – with every individual and Research Center given a budget and sequencing target. The skills provided therefore must be applied by participants and their colleagues on a yearly basis.

Review comment 3:
Consider making indicators timebound to month of achievement to help with monitoring over the project timeline.

Response 3: Project teaching and organisational leads met monthly to assess indicator achievement and knock-on effects for planning where relevant.

9. Risk Management

All risks were accounted for and no new risks emerged irrespective of an election and shift of government.

10. Sustainability and legacy

Each BRIN plant-evolution staff member have to produce a plastid genome this year and this will increase year on year. The skills developed have been key to this happening successfully.

As the new capital city in Kalimantan takes shape a new genomics large-scale genomics facility is planned and the track record skillsets of our participants will ensure they have the greatest chance to profit from this.

The teaching materials we have built and adapted with participants are available freely to them and there is already interest for replicated workshops at Universitas Indonesia, a key research-led institution in the country.

Participants have since published the following genomics-based papers:
10.1016/j.japb.2023.08.009
10.1088/1755-1315/1271/1/012006

11. Darwin Initiative identity

We are building a Kew Read and Watch blog for Kew Indonesia activities over the past year which will include a significant section on this project.
I have also published blogs highlighting each workshop:
https://liamtrethowan.com/2023/10/26/growing-indonesian-genomics/
https://liamtrethowan.com/2024/04/26/gig-2/

These works recognise how this project was distinct from other Kew research and development. It marks Kew's first genomics capacity building in tropical Asia.

All these outreach activities highlight how the funding comes from the Darwin Initiative/UK Government. Given Kew is also a government arms reach body it is clear how key UK government is to 'Growing Indonesian Government'.

12. Safeguarding

Has your Safeguarding Policy been updated in the past 12 months?		No
Have any concerns been reported in the past 12 months		No
Does your project have a Safeguarding focal point?	No	
Has the focal point attended any formal training in the last 12 months?	No	
What proportion (and number) of project staff have received formal training on Safeguarding?		Past: 25 % [1 Planned: 25 % [1]
Has there been any lessons learnt or challenges on Safeguarding in the past 12 months? Please ensure no sensitive data is included within responses. **We have had zero safeguarding issues.**		
Please describe any community sensitisation that has taken place over the past 12 months; include topics covered and number of participants. N/A		
Have there been any concerns around Health, Safety and Security of your project over the past year? If yes, please outline how this was resolved. No issues.		

13. Project expenditure

Table 1: Project expenditure during the reporting period (1 April 2023 – 31 March 2024)

Project spend (indicative) since last Annual Report	2023/24 Grant (£)	2023/24 Total Darwin Initiative Costs (£)	Variance %	Comments (please explain significant variances)
Staff costs (see below)	[redacted]			
Consultancy costs				
Overhead Costs				
Travel and subsistence				Slightly fewer participants than expected travelled to our second workshop from outside Bogor.
Operating Costs				Sequencing costs slightly higher than expected.
Capital items (see below)				
Others (see below)				Some costs were reduced..
TOTAL	**111,012**	**105,234**		

Capital underspend still has the potential to be spent and further support genomics capacity in country. A change request has been submitted for this.

Project mobilised or matched funding during the reporting period (1 April 2023 – 31 March 2024)

	Secured to date	Expected by end of project	Sources
Matched funding leveraged by the partners to deliver the project (£)	[redacted]		RBG Kew
Total additional finance mobilised for new activities occurring outside of the project, building on evidence, best practices and the project (£)			

14. Other comments on progress not covered elsewhere

The genomics targets for BRIN staff arrived post project application and gave the project even greater relevance/importance for the institute and staff.

15. OPTIONAL: Outstanding achievements or progress of your project so far (300-400 words maximum). This section may be used for publicity purposes.

I agree for the Biodiversity Challenge Funds to edit and use the following for various promotional purposes (please leave this line in to indicate your agreement to use any material you provide here).

Royal Botanic Gardens Kew in collaboration with Badan Riset Inovasi Nasional Research Center for Biosystematics and Evolution have trained 14 Indonesian participants (9 women and 5 men) in state-of-the-art genomic techniques to aid the identification of climate resilient useful plants and natural ecological communities. From collecting samples in the field to Oxford Nanopore Tech sequencing in the lab a team of instructors and organisers from 5 countries worked closely with participants at various career stages to acquire new skills at the cutting edge of plant science.

File Type (Image / Video / Graphic)	**File Name or File Location**	**Caption including description, country and credit**	**Social media accounts and websites to be tagged (leave blank if none)**	**Consent of subjects received (delete as necessary)**
Image		Collecting Breadfruit samples around Malang East Java. (Photo Liam Trethowan)	@KewScience	No (I can acquire if needed)
Image		Hariri teaching genome assembly theory in Cibinong, Bogor. (Photo Liam Trethowan)	@KewScience	No (I can acquire if needed)
				Yes / No
				Yes / No
				Yes / No

Annex 1: Report of progress and achievements against Indicators of Success for Financial Year 2023-2024

Project summary	Progress and Achievements April 2023 - March 2024	Actions required/planned for next period
Outcome Scientists trained in applying cutting edge genomic techniques to enhance sustainable livelihoods and plant conservation.		
Outcome indicator 0.1 Participants have a theoretical understanding of genomic approaches to characterize genotype-phenotype-environment (GPE) associations.	14 participants have learnt a broad theoretical syllabus from GPE associations through application of phylogenomics and genome sequencing.	
Outcome indicator 0.2 Participants have bioinformatic and analytical skills required to characterise GPE associations.	14 participants have carried out the process of genome assembly to landscape genomic association analysis.	
Outcome indicator 0.3 Resources are available for participants to continue and expand training post project.	A shared access folder underpins future analytical and training plans post project. We have supplied hardware for future project completion.	
Output 1. Genomic data are generated from samples collected across the Javan rainfall gradient.		
Output indicator 1.1 Prior to the first workshop samples of 4 individuals for 6 populations (24 samples total) are obtained for breadfruit, across the rainfall gradient at sites near Bogor and Purwodadi Botanic Gardens that span the drought gradient in Java.	We collected 33 samples around Bogor and Malang (Purwodadi). This successfully covered the Javan drought gradient and these extra samples were effectively sequenced as part of our budget.	
Output indicator 1.2 Prior to the first workshop medium coverage Illumina sequencing data for the 24 samples is generated. Additional Illumina high coverage genome sequencing data are obtained for 2 of these samples.	10 X coverage sequencing for 31 samples carried out alongside 30 X coverage for 2 of these samples. Sequencing outsourced to PT Genetika Science.	
Output indicator 1.3 MinION sequencing data are obtained for the same 2 samples – a sample is sequenced as part of each workshop.	18 ONT minION sequencing experiments have been carried out for our two focus samples which will lead to final publishable high-quality genome assemblies.	
Output 2. Teaching materials produced by the investigator team.		

Output indicator 2.1 Teaching resources built pre first workshop.	Teaching materials were produced following the scope determined by participants post M&E.	
Output indicator 2.2 Post second workshop teaching resources honed for use post project.	Full teaching materials available to participants post workshop. These were worked up with the help of participants who later became teachers/instructors.	
Output 3. Capacity for teaching and analysis of genomic data is enhanced.		
Output indicator 3.1 All four participants of the first workshop are capable of processing Illumina and minION genomic data for association studies and understand the rationales behind the analytical decisions.	Breadfruit plastid genomes were assembled by all participants.	
Output indicator 3.2 All 11 second workshop participants are capable of processing Illumina and minION genomic data for association studies and understand the rationales behind the analytical decisions.	Breadfruit plastid genomes were assembled by all participants.	
Output 4. A roadmap towards future genomics teaching and/or future genomics projects to be held in Indonesia and led by some of the participants.		
Output indicator 4.1 Further teaching or capacity building needs and potential future students identified.	Future students identified at alternate institutions we invited potential partners at Universitas Indonesia to visit during course time and a need for a similar course at this key research institute was clarified.	
Output indicator 4.2 Potential future projects identified and outlined by participants including genomics costings for a tractable budget.	Future projects were workshopped and a manuscript to publish the two high quality breadfruit genomes was decided upon.	

Annex 2: Project's full current Indicators of Success as presented in the application form (unless changes have been agreed)

	SMART Indicators	Means of Verification
Outcome (Max 30 words): Scientists trained in applying cutting edge genomic techniques to enhance sustainable livelihoods and plant conservation.	0.1 Participants have a theoretical understanding of genomic approaches to characterize genotype-phenotype-environment (GPE) associations. 0.2 Participants have bioinformatic and analytical skills required to characterise GPE associations. 0.3 Resources are available for participants to continue and expand training post project.	0.1 Participants successfully outline the design and methods required to achieve a future project looking at associations between genes and traits and/or environmental conditions. 0.2 Participants successfully process genomic data and identify genomic regions potentially associated with climatic preference. 0.3 Adaptable teaching material, templates and analytical pipelines are freely available via an online repository e.g. figshare/zenodo.
Output 1 (Max 30 words) Genomic data are generated from samples collected across the Javan rainfall gradient.	1.1 Prior to the first workshop samples of 4 individuals for 6 populations (24 samples total) are obtained for breadfruit, across the rainfall gradient at sites near Bogor and Purwodadi Botanic Gardens that span the drought gradient in Java. 1.2 Prior to the first workshop medium coverage Illumina sequencing data for	1.1 List of samples deposited made available via an online repository e.g. figshare/zenodo. Samples and vouchers deposited and databased at Herbarium Bogoriense. 1.2/3 Genomic data will be deposited in online depositories by stakeholders. A report highlighting what data has been produced will be made

	the 24 samples is generated. Additional Illumina high coverage genome sequencing data are obtained for 2 of these samples. 1.3 MinION sequencing data are obtained for the same 2 samples – a sample is sequenced as part of each workshop.	available via an online repository e.g. figshare/zenodo.
Output 2 (Max 30 words) Bilingual teaching materials produced by the investigator team.	2.1 Teaching resources built and translated pre first workshop. 2.2 Post second workshop teaching resources honed and translated for use post project.	2.1 Version 1 teaching materials made available via an online repository e.g. figshare/zenodo. 2.2 Final version of teaching materials made available via an online repository e.g. figshare/zenodo.
Output 3 (Max 30 words) Capacity for teaching and analysis of genomic data is enhanced.	3.1 All four participants of the first workshop are capable of processing Illumina and minION genomic data for association studies and understand the rationales behind the analytical decisions. Three female participants are confirmed. 3.2 All 11 second workshop participants are capable of processing Illumina and minION genomic data for association studies and understand the rationales behind the analytical decisions.	3.1 The four participants from the first workshop successfully teach the second cohort of participants. 3.2 Short summary report written by participants of the bioinformatics workshops.

Output 4 (Max 30 words) A roadmap towards future genomics teaching and/or future genomics projects to be held in Indonesia and led by some of the participants.	4.1 Further teaching or capacity building needs and potential future students identified. 4.2 Potential future projects identified and outlined by participants including genomics costings for a tractable budget. 4.3 An adaptable template to produce personalised roadmaps and draft budgets for future projects built.	4.1 Future needs/support summary report made available via an online repository e.g. figshare/zenodo. 4.2 Details of specific projects designed by participants available on request if permission given by participant. 4.3 Roadmap template made available via an online repository e.g. figshare/zenodo.

Activities (each activity is numbered according to the Output that it will contribute towards, for example 1.1, 1.2 and 1.3 are contributing to Output 1). Each activity should start on a new line and be no more than approximately 25 words.

1.1a Field breadfruit leaf sampling takes place around Bogor and Purwodadi botanic garden – led by instructors.

1.1b DNA is extracted and sent to selected company for sequencing.

1.2a ONT minION sequencing carried out in the field by instructors and participants.

2.1a Preparation/translation of theoretical lectures.

2.1b Preparation of practical teaching material.

2.1c Preparation of teaching data.

2.1d Setting up hardware and software.

2.2a Teaching resources improved during a collaborative session with participants of workshop 1.

2.2b Teaching resources improved during a collaborative session with participants pf workshop 2.

3.1a First workshop participants identified and selected dependent upon pre-agreed criteria.

3.1b During first workshop in Bogor relevant bioinformatic pipelines are taught using training data for both ONT and genome skimming data.

3.1c Feedback gathered from participants and this used to improve materials/2nd workshop structure.

3.1d The four participants analyse novel data from 1.2a/b post workshop with assistance where needed from instructor team.

3.2a Second workshop participants identified and selected dependent upon pre-agreed criteria.

3.2b Instructors/participants from cohort 1 prepare for workshop 2.

3.2c Second workshop in Bogor. Larger cohort learn and carry out the required bioinformatics for both ONT and genome skimming data.

3.2d Feedback gathered from participants and this used to improve final teaching materials that are made freely available.

4.1 Main project report writing with participants. Results summarised and possibility for formal paper(s) assessed.

4.2 Collaborative writing post workshop two and later via google docs to produce future project roadmaps. Focusing upon projects suggested by participants.

4.3 Instructors informed by participants produce an adaptable project roadmap/budget template.

Important Assumptions:

Please describe up to 6 key assumptions that, if held true, will enable you to deliver your Outputs and Outcome

(Max 100 words):

In-country access for instructors.

Participant availability.

Field access results in sequencing/genomic data available for analysis.

Sufficient internet access for data processing and teaching.

Teaching material adapted to the knowledge level and expectations of the participants

Sufficient time allowed for teaching and learning.

Annex 3: Standard Indicators

Table 1 Project Standard Indicators

DI Indicator number	Name of indicator	Units	Disaggregation	Year 1 Total	Year 2 Total	Year 3 Total	Total to date	Total planned during the project
DI-A01	Number of people in eligible countries who have completed structured and relevant training	People	Men	5			14	6
DI-A01	Number of people in eligible countries who have completed structured and relevant training	People	Women	9			14	8
DI-C09	Species reference collections made (known to science, new to science).	Number	Breadfruit	33			33	24
DI-A03	Number of local/national organisations4 with improved capability and capacity as a result of project.	Number	Improved	4			4	1
DI-A04	Number of people reporting that they are applying new capabilities (skills and knowledge) 6 (or more) months after training	People	Male	1			1	1
DI-A04	Number of people reporting that they are applying new capabilities (skills and knowledge) 6 (or more) months after training	People	Female	4			4	4
DI-A05	Number of trainers trained reporting to have delivered further training by the end of the project.	People	Male	1			1	1
DI-A05	Number of trainers trained reporting to have delivered further training by the end of the project.	People	Female	4			4	4

Annex 4: Onwards – supplementary material (optional but encouraged as evidence of project achievement)

Checklist for submission

	Check
Different reporting templates have different questions, and it is important you use the correct one. Have you checked you have used the **correct template** (checking fund, type of report (i.e. Annual or Final), and year) and **deleted the blue guidance text** before submission?	x
Is the report less than 10MB? If so, please email to BCF-Reports@niras.com putting the project number in the Subject line.	x
Is your report more than 10MB? If so, please discuss with BCF-Reports@niras.com about the best way to deliver the report, putting the project number in the Subject line.	x
Have you included means of verification? You should not submit every project document, but the main outputs and a selection of the others would strengthen the report.	x
If you are submitting photos for publicity purposes, do these meet the outlined requirements (see section 15)?	x
Have you involved your partners in preparation of the report and named the main contributors	x
Have you completed the Project Expenditure table fully?	x
Do not include claim forms or other communications with this report.	