CocoaAction’s
Cocoa Farmer Economic Model
10/01/2017
Rationale
(original 2013 use-case)

What is necessary for a viable business case for farmers?
What is the expected impact of farm-level interventions on the business case?

A dynamic model is needed that:
1. Takes into account **relevant variables**
2. Allows the user to adjust the values (**adjustable variables**)
3. Shows the result of any particular combination of variables on the income of a “typical” cocoa farmer

Scenario testing can then be used to derive **strategic insights**, plan interventions accordingly and mitigation risk of failure.
Scope of the final model

In scope
1. Provide assumptions to indicate business case on farm level
2. Inform and validate CocoaAction strategy
3. Identify sensitivity of outcomes to certain variables
4. Derive directional strategic and policy implications
5. Inform about magnitudes and timing of change

Out of scope
1. Recommend specific or exact figures for individual cases (e.g. optimal replanting rate)
2. Present an accurate and realistic view that fully represents a specific farmer’s business case
3. Inform commercial strategies
4. Several additional elements not currently included (e.g. living income benchmark)
Interface: Variables

if you’d like, try it yourself here: https://hub.cocoaaction.org/econmodel/public/

Adjustable variables
Variables are modified interactively while viewing the live-output

Over 50 modifiable variables provide an enormous amount of customizability—for the better and worse

Initial default variable states are based on averages of background research and represent a ‘typical’ cocoa farm (if that exists...)
All changes are immediately displayed in the graph window.

After adjusting a variable, a ‘rewind’ button allows to reset individual variables to their default state.
Interface: Graph and Quick-Stats

- Clicking legend elements gives limited visualization control
- Hovering the mouse over graph elements shows data-details
- No full API support as of now, but definitely gauging interest for that
Interface: Seasonality & Feedback

Current view: main summary

- Monthly cocoa income break-down
- Monthly cocoa farm labor requirements break-down

Guide, feedback & discussion

Graph legend & control
Interface: Research & Social Media

Farmer Economic Model

- Farm & Farmers Characteristics
- Cocoa Farm Economics
- Cocoa Farm Interventions
- Tree Productivity Per Year
- Labor
- Monthly Distribution of Economics
- Fertilizer

Summary: Research data & parameter reset

Net Income (USD)
- Minimum: 1766, Year 3
- Maximum: 3651, Year 11

Yield (kg/ha)
- Minimum: 412, Year 4
- Maximum: 902, Year 12

Sharing & saving progress

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Use Cases: Decision Support

- Decision support tool, especially in complex multi-stakeholder arrangements:
  - Alignment around key assumptions
  - Clearly establish an independent, data driven basis for policy discussion
  - Agreeing on empirical methods for joint decision making

At a secret location, a CocoaAction meeting some time in February 2013...

Say, how much should cocoa farmers rehabilitate their farms anyhow?

12% per year!

No no no, anything over 3% is crazy!

Our farmers don’t need that—at all!
Use Cases: Project Risk Management

- Entirely over-aged farm
- 1ha size at 1500 trees/ha
- No additional income

- 10% Replanting for 10 years
- GAP & fertilizer starts at Yr 7
- 5% replacement from Yr 18

9 Years of Low Income
- Production Down
- Labour for Replanting
- Income Down

10-18 Years
- Increasing Production
- No Replanting
- Net Income +/- $ 5,500

18 Onwards
- Declining Production
- 5% Replacement
- Net Income Settles +/- $ 3,800
Use Cases: Project Risk Management

- Entirely over-aged farm
- 1ha size at 1500 trees/ha
- No additional income
- 10% Replanting for 10 years
- GAP & fertilizer starts at Yr 7

- 5-7 Years of non-cocoa income – very hard to sell
- Rehabilitation is not **commercially** bankable and farmer not prepared to use other income to cover cost / loss of income
- Need for whole Farm & non-Farm income generation
- Seasonal v Annual Income – need for Household Cashflow strategy
- How to turn on-farm activities into paid labour activities
- Multi-stakeholder strategy needed
Discussion

Strategic Questions for CocoaAction suggested by the Model:

- How well do we know our farmers—do we address mostly extreme cases, or a lot of in-between cases? Do existing outreach systems allow “cherry picking” to reach programmatic targets?

- Are we prepared for the worst-case farms to miss their short term yield target? No form of intervention allows to reap sufficient benefits within the next 5 years on those farms.

- Are we willing to support the worst-case farmers with more aggressive intervention to get them on the right track for long term success? Protection from the dramatic income drop is important...

- How can we use the CocoaAction minimum commitments to get to know the extreme cases and engage farmers on a farm-needs basis in the long-term?

- How do we adapt our thinking and support models? The short-term worst-cases are in reality the long-term best opportunities for growth...
NewForesight and WCF would like to stimulate an open discussion about the (economic, financial) conditions under which it is possible to create a true sustainable (cocoa) farming model, and what needs to be done in order to make this possible
What do we want to answer?

• General views on role of economic modelling in agriculture sustainability
• Feedback to CocoaAction Farmer Economic Model + improvement opportunities

• Implications for sustainability in agriculture:
  • Which conditions are needed to reach a truly sustainable farming model in cocoa?
  • What needs to happen to make this possible? (E.g., financing)
  • (How) does such a tool get used?
  • What are lessons from other sectors?
  • What are benefits?
  • How can this benefit learning?
  • How to generate a collaborative approach to learning and improvement? (E.g., crowd-sourcing of data, assumptions, findings)
What would this process look like?

We propose the following process:

1. WCF and NF send preparation materials including:
   - Online model instructions
   - Guidance questions

2. WCF and NF have a webinar to explain how the model works (for participants who wish to have additional guidance)

3. Participants test the model and note their feedback to questions in an online survey

4. WCF and NF organize a webinar to solicit discussion and feedback from participants

5. Results will be summarized in a white paper

Are you interested to take part? If so, please contact:

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Will Saab, NewForesight (william.saab@newforesight.com)
BACKUP SLIDES
(additional information)
Modeling Principles

• The model focuses on **socio-economic** parameters of farming and considers environmental parameters only implicitly (i.e. expressed in default variable states and seasonality settings)

• **Background assumptions:**
  - Stable environmental conditions over time
  - Average growing conditions for West Africa (i.e. regarding soil/topography etc.)
  - The farm management set-up is rather homogeneous (model can simulate heterogeneity to a certain degree via two-plot settings)
  - Economies of scale are not considered (i.e. influence of variables is strictly linear)
  - Start/end time of management practices can be simulated, but no change in management practices over the time-frame of 15 years (however, this can be simulated by merging several model outputs, see slide 13)
Development of the Model

- **Initial use case**: decision support tool for high-level committee of CocoaAction
- **Initial development**: excel based model by NewForesight Consulting

- **Added use case**: learning tool for wider CocoaAction partnership
- **Added development**: programming of an open-source online interface as part of the CocoaAction Hub (account based platform)

- **Added use case**: sector wide learning tool for all interested parties
- **Added development**: provision of a parallel model instance on an open website as a spin-off of the CocoaAction Hub
  
  [https://hub.cocoaaction.org/econmodel/public/](https://hub.cocoaaction.org/econmodel/public/)
Learnings: Some CocoaAction insight

Scenario 1: Status Quo
• “Business as usual”: cocoa farming without planned interventions on old farms

Scenario 2: Slow rehabilitation
• Slow replanting rate and interventions package

Scenario 3: Aggressive rehabilitation
• Aggressive replanting rate and interventions package
Scenario 1: Status Quo (Base case scenario)

CocoaAction yield target: 700kg/ha by 2020

Strategic Insights

- Decreasing cocoa income over the years
- Main reason: old age of current tree stock
- Strategic insights: importance of rehabilitation of cocoa farms in Ivory Coast and Ghana clearly established

Instructions

- Reset to the default variables (“reset all variables”)
- Adjust the tree age to 28 years for all trees on the farm (Farm & Farmer Characteristics)
- Deactivate GAP interventions, deactivate fertilizer interventions, select “no rehabilitation” as rehabilitation type (Cocoa Farm Interventions)
Scenario 2: Slow Rehabilitation

**CocoaAction yield target: 700kg/ha by 2020**

**Strategic Insights**

- Replanting rate not fast enough to counter decreasing yield on older stock (see what happens when you switch off GAPs/Fert. application)

- Use of fertilizers and crop protection only on newly-replanted part of farm keeps input costs relatively low and boosts yield from year 6-7 on (compare the effect when you activate interventions on old & new farm area)

- By year 15 (2030), 55% of the farm will still be old stock trees

**Instructions**

- Reset to the default variables (“reset all variables”)

- Adjust the tree age to 28 years for all trees on the farm (Farm & Farmer Characteristics)

- Adjust Fertilizer & GAP interventions to start at year 1 (Cocoa Farm Interventions)

- Change the rehabilitation % to 3 per year (Cocoa Farm Interventions)

- Adjust rehabilitation to occur every 1 year (Cocoa Farm Interventions)
Scenario 3: Aggressive Rehabilitation

CocoaAction yield target: 700kg/ha by 2020

Instructions

- Reset to the default variables (“reset all variables”)
- Adjust the tree age to 28 years for all trees on the farm (Farm & Farmer Characteristics)
- Adjust Fertilizer & GAP interventions to start at year 1 (Cocoa Farm Interventions)
- Change the rehabilitation % to 10 per year (Cocoa Farm Interventions)
- Adjust rehabilitation to occur every 1 year (Cocoa Farm Interventions)
- Adjust the rehabilitation limit to 100% of the farm stock (Cocoa Farm Interventions)
Interpretation and Things to Try-Out

• All presented scenarios consider an extreme case of a farm: the over-aged, homogeneous farm. Remember that not all farms are like that!

• Changing farm settings and comparing the model outcomes will show you that economic success of cocoa farming is very closely linked to certain farm variables.

• The cocoa farmer and their farm context is the whole key to understanding potential success of farm intervention programs.

• **Try Out**
  → what interventions would a farmer need with cocoa that is 10 years old to reach an income of around 3000$ and to sustain it?
  → what effect does farm heterogeneity have (one farm with 2 different age classes)?