

## ANNEX 24. OTHER RELEVANT REFERENCES

### ESTIMATION OF BENEFICIARIES: DIRECT AND INDIRECT

**The direct beneficiaries** were estimated based on the agreements made by the farmer's associations and the implementing entities. We take in account the amount of resources available for the different activities, as well as the expected adoption curves of the technologies. The technology adoption curves were based on expert opinions from diverse scientists and technicians from farmer's associations and implementing entities, using the more conservative figures and scenarios. The direct beneficiaries consider the people per household.

**Indirect beneficiaries during the project period** were estimated on the adoption curves of the different components. This were constructed with parameters of experts participating in the project and/or literature of relevance. The percentage of producers who would use the technologies was estimated until the end-year of the project. This estimate excludes direct beneficiaries.

**The total indirect beneficiaries** were estimated based on the adoption curves of the different technologies until their maximum adoption level is reached, which in many cases goes beyond the life cycle of the project. This percentage excludes direct and indirect beneficiaries under the project.

#### ***Ex ante evaluation and Adoption Curves:***

A comparative static simulation exercise was developed to evaluate the potential impacts of the project implementation using the economic surplus framework, a standard methodology of economic assessment of project rate-of-returns. The analysis focused on the eight target crops: bananas, corn, coffee, livestock (milk and meat), potatoes, panela cane, rice, and sugar cane. The simulation exercise depended on the assumptions established about the markets of interest and on relevant parameters, such as the price elasticities of supply and demand, the initial average prices of the products, the initial annual production, and the technological effects of the intervention on the yield changes or costs of production, technology adoption curves, among others.

For the parameterization of the models, surveys and interviews with experts from the Alliance Bioversity-CIAT and each sector were used, as well as specialized literature on the subject. This consultation allows us to estimate the expected effects of technology and the construction of the technology adoption curves. In total, 26 surveys were collected (six on rice, one on sugar cane, four on bananas, four on coffee, three on beef cattle, one on dairy cattle, three on corn, two on panela, and two on potatoes). The collected surveys were classified by component. The technological effect (change in yields, cost of production, or production losses averted) was established in percentage terms for each of the project components:

1. Agroclimatic Risk Management + Digital Agriculture.
- 2a. Genetic improvement and related technologies.
- 2b. Use of water resources and emissions) as appropriate.

The respondents also described two possible adoption scenarios (a) conservative scenario of technology adoption (minimum expected adoption) and (b) optimist scenario of technology adoption (maximum expected adoption). Subsequently the respondents described the potential evolution of the technology adoption, taking into account the time required to start the intervention, expected time to reach adoption level, expected time to obsolescence.

The following tables per crop and components described the beneficiary estimates. Tables present in each columns the number of beneficiaries or hectares by component, while the last two columns summarize the total number for the crop. Also, direct beneficiaries and hectares are disaggregated between direct, and indirect, and total indirect beneficiaries:

## Rice

	Numer o	Porcentaj e	Numer o	Porcentaj e	Numer o	Porcentaj e	Numero	Porcentaj e	Numer o	Porcentaj e
<i>Beneficiarios</i>										
(Estimación líderes) Beneficiarios directos productores	3,491	21%	1,397	9%	300	2%	3491	21%	8,679	62%
(Modelación -2027) Beneficiarios del proyecto productores	2,866	18%	3,439	21%	4,340	27%			4,340	27%
(Modelación - adopción Max) Beneficiarios indirectos	6,551	40%	9,991	61%	10,646	65%			10,646	65%
(curvas de adopción mínimo) Beneficiarios indirectos	2,866	18%	6,715	41%	5,732	35%			6,715	41%
(Estimación líderes) Beneficiarios directos personas	9,114		4,442		954		11,101			
<i>Hectáreas</i>										
(Estimación líderes) Hectáreas Directas	90,000	17%	36,000	7%	1,500	0.3%	90,000	17%	127,500	29%
(Modelación 2027) Hectáreas del proyecto	92,953	18%	111,543	21%	140,757	27%			140,757	27%
(Modelación adopción Max) Hectáreas Indirectas totales	212,463	40%	324,006	61%	345,253	65%			345,253	65%
(Modelación adopción min) Hectáreas Indirectas totales	92,953	18%	217,775	41%	185,905	35%			217,775	41%

## Potato

	Numer o	Porcentaj e	Numer o	Porcentaj e	Numer o	Porcentaj e	Numero	Porcentaj e	Numer o	Porcentaj e
<i>Beneficiarios</i>										
(Estimación líderes) Beneficiarios directos	13,089	13%	3,070	3%	660	1%	14,500	21%	31,319	34%
(Modelación -2027) Beneficiarios del proyecto	30,000	30%	27,000	27%	19,000	19%			30,000	30%
(Modelación - adopción Max) Beneficiarios indirectos	40,000	40%	60,000	60%	45,000	45%			60,000	60%
(Modelación - adopción Min) Beneficiarios indirectos	30,000	30%	40,000	40%	25,000	25%			40,000	40%
(Estimación líderes) Beneficiarios directos personas	41,623		9,763		2,099		46,110			
<i>Hectáreas</i>										
(Estimación líderes) Hectáreas Directas	26,178	20%	6,140	5%	660	0.5%	29,000	22%	32,978	30%
(Modelación 2027) Hectáreas del proyecto	40,071	30%	36,064	27%	25,378	19%			40,071	30%
(Modelación adopción Max) Hectáreas Indirectas totales	53,428	40%	80,142	60%	60,107	45%			80,142	60%
(Modelación adopción min) Hectáreas Indirectas totales	40,071	30%	53,428	40%	33,393	25%			53,428	40%

## Sugar cane

	Numer o	Porcentaj e	Numer o	Porcentaj e	Numero	Porcentaj e	Numero	Porcentaj e	Numer o	Porcentaj e
<i>Beneficiarios</i>										
(Estimación líderes) Beneficiarios directos	2,200	80%	2,200	80%	0%	0%	800	29%	2,200	80%
(Modelación -2027) Beneficiarios del proyecto	358	13%	1,650	60%	0%	0%			1,650	60%
(Modelación - adopción Max) Beneficiarios indirectos	2,200	80%	2,200	80%	220000 %	80%			2,200	80%
(Modelación - adopción Min) Beneficiarios indirectos	358	13%	1,650	60%	123750 %	45%			1,650	60%
(Estimación líderes) Beneficiarios directos personas	1,138		5,247		0%		2,544			
<i>Hectáreas</i>										
(Estimación líderes) Hectáreas Directas	194,40 0	80%	63,580	26%	0%	0%	70000	29%	194,40 0	80%
(Modelación 2027) Hectáreas del proyecto	31,590	13%	145,80 0	60%	0%	0%			145,80 0	60%
(Modelación adopción Max) Hectáreas Indirectas totales	194,40 0	80%	194,40 0	80%	194,400	80%			194,40 0	80%
(Modelación adopción min) Hectáreas Indirectas totales	31,590	13%	145,80 0	60%	109,350	45%			145,80 0	60%

## Panela cane

	Numer o	Porcentaj e	Numer o	Porcentaj e	Numer o	Porcentaj e	Numero	Porcentaj e	Numer o	Porcentaj e
<i>Beneficiarios</i>										
(Estimación líderes) Beneficiarios directos	7,000	2%	0	0%	633	0%	12000	3%	19,633	6%
(Modelación -2027) Beneficiarios del proyecto	10,500	3%	4,760	1%	50,750	15%			50,750	15%
(Modelación - adopción Max) Beneficiarios indirectos	70,000	20%	9,520	3%	183,75 0	53%			183,75 0	53%
(Modelación - adopción Min) Beneficiarios indirectos	35,000	10%	5,712	2%	113,75 0	33%			113,75 0	33%
(Estimación líderes) Beneficiarios directos personas	22,260		15,137		2,013		38,160			
<i>Hectáreas</i>										
(Estimación líderes) Hectáreas Directas	14,000	4%	7,000	2%	1,030	0.3%	24000	21%	22,030	6%
(Modelación 2027) Hectáreas del proyecto	11,030	3%	5,000	1%	53,309	15%			53,309	15%
(Modelación adopción Max) Hectáreas Indirectas totales	73,530	20%	10,000	3%	193,01 7	53%			193,01 7	53%
(Modelación adopción min) Hectáreas Indirectas totales	36,765	10%	6,000	2%	119,48 7	33%			119,48 7	33%

## Dairy farming

	Numero	Porcentaj e	Numero	Porcentaj e	Numero	Porcentaj e	Numero	Porcentaj e	Numero	Porcentaj e
<i>Beneficiarios</i>										
<b>(Estimación líderes) Beneficiarios directos</b>	8,175	4%	0	0%	480	0%	8175	4%	<b>16,830</b>	9%
(Modelación -2027) Beneficiarios del proyecto	27,272	15%	0	0%	10,909	6%			27,272	15%
(Modelación - adopción Max) Beneficiarios indirectos	36,363	20%	63,635	35%	72,726	40%			72,726	40%
(Modelación - adopción Min) Beneficiarios indirectos	27,272	15%	27,272	15%	18,181	10%			27,272	15%
<b>(Estimación líderes) Beneficiarios directos personas</b>	25,997		0		1,526		25,997			
<i>Hectáreas</i>										
<b>(Estimación líderes) Hectáreas Directas</b>	256,119	3%	0	0%	1,920	0%	0	0%	<b>258,039</b>	3%
(Modelación 2027) Hectáreas del proyecto	1,251,000	15%	0	0%	500,400	6%			1,251,000	15%
(Modelación adopción Max) Hectáreas Indirectas totales	1,668,000	20%	2,919,000	35%	3,336,000	40%			3,336,000	40%
(Modelación adopción min) Hectáreas Indirectas totales	1,251,000	15%	1,251,000	15%	834,000	10%			1,251,000	15%

## Livestock

	Numero	Porcentaj e	Numero	Porcentaj e	Numero	Porcentaj e	Numero	Porcentaj e	Numero	Porcentaj e
<i>Beneficiarios</i>										
<b>(Estimación líderes) Beneficiarios directos</b>	8,175	4%	0	0%	480	0%	8175	4%	<b>16,830</b>	9%
(Modelación -2027) Beneficiarios del proyecto	27,272	15%	0	0%	10,909	6%			27,272	15%
(Modelación - adopción Max) Beneficiarios indirectos	36,363	20%	63,635	35%	72,726	40%			72,726	40%
(Modelación - adopción Min) Beneficiarios indirectos	27,272	15%	27,272	15%	18,181	10%			27,272	15%
<b>(Estimación líderes) Beneficiarios directos personas</b>	25,997		0		1,526		25,997			
<i>Hectáreas</i>										
<b>(Estimación líderes) Hectáreas Directas</b>	256,119	3%	0	0%	1,920	0%	0	0%	<b>258,039</b>	3%
(Modelación 2027) Hectáreas del proyecto	1,251,000	15%	0	0%	500,400	6%			1,251,000	15%
(Modelación adopción Max) Hectáreas Indirectas totales	1,668,000	20%	2,919,000	35%	3,336,000	40%			3,336,000	40%
(Modelación adopción min) Hectáreas Indirectas totales	1,251,000	15%	1,251,000	15%	834,000	10%			1,251,000	15%

## Corn

	Numer o	Porcentaj e	Numer o	Porcentaj e	Numer o	Porcentaj e	Numero	Porcentaj e	Numer o	Porcentaj e
<i>Beneficiarios</i>										
<b>(Estimación líderes) Beneficiarios directos</b>	3,580	1%	3,070	1%	900	0%	6000	2%	<b>13,550</b>	5%
(Modelación -2027) Beneficiarios del proyecto	54,600	20%	21,840	8%	62,108	23%			62,108	23%
(Modelación - adopción Max) Beneficiarios indirectos	109,200	40%	125,580	46%	136,500	50%			136,500	50%
(Modelación - adopción Min) Beneficiarios indirectos	54,600	20%	60,060	22%	81,900	30%			81,900	30%
<b>(Estimación líderes) Beneficiarios directos personas</b>	11,384		9,763		2,862		19,080			
<i>Hectáreas</i>										
<b>(Estimación líderes) Hectáreas Directas</b>	10,740	4%	9,210	3%	900	0%	18000	6%	<b>20,850</b>	8%
(Modelación 2027) Hectáreas del proyecto	55,580	20%	22,232	8%	63,222	23%			63,222	23%
(Modelación adopción Max) Hectáreas Indirectas totales	111,160	40%	127,834	46%	138,950	50%			138,950	50%
(Modelación adopción min) Hectáreas Indirectas totales	55,580	20%	61,138	22%	83,370	30%			83,370	30%

## Banana

	Numer o	Porcentaj e	Numer o	Porcentaj e	Numer o	Porcentaj e	Numero	Porcentaj e	Numer o	Porcentaj e
<i>Beneficiarios</i>										
<b>(Estimación líderes) Beneficiarios directos</b>	684	80%	684	80%	1,250	146%	684	80%	1,250	80%
(Modelación -2027) Beneficiarios del proyecto	147	17%	73	9%	184	21%			<b>184</b>	21%
(Modelación - adopción Max) Beneficiarios indirectos	542	63%	342	40%	499	58%			542	63%
(Modelación - adopción Min) Beneficiarios indirectos	285	33%	299	35%	242	28%			299	35%
<b>(Estimación líderes) Beneficiarios directos personas</b>	467		233		584		2,175			
<i>Hectáreas</i>										
<b>(Estimación líderes) Hectáreas Directas</b>	38,000	78%	600	1%	1,250	3%	0	0%	38,000	78%
(Modelación 2027) Hectáreas del proyecto	8,412	17%	2,341	5%	10,534	21%			<b>10,534</b>	21%
(Modelación adopción Max) Hectáreas Indirectas totales	31,033	63%	19,600	40%	28,583	58%			31,033	63%
(Modelación adopción min) Hectáreas Indirectas totales	16,333	33%	17,150	35%	13,883	28%			17,150	35%

## Coffee

	Numero	Porcentaje	Numero	Porcentaje	Numero	Porcentaje	Numero	Porcentaje	Numero	Porcentaje
<i>Beneficiarios</i>										
<b>(Estimación líderes) Beneficiarios directos</b>	80,000	15%	0	0%	0	0%	0	0%	<b>80,000</b>	15%
(Modelación -2027) Beneficiarios del proyecto	81,600	15%	0	0%	0	0%			81,600	15%
(Modelación - adopción Max) Beneficiarios indirectos	190,400	35%	0	0%	285,600	53%			285,600	53%
(Modelación - adopción Min) Beneficiarios indirectos	81,600	15%	0	0%	24,480	5%			81,600	15%
<b>(Estimación líderes) Beneficiarios directos personas</b>	254,400									
<i>Hectáreas</i>										
<b>(Estimación líderes) Hectáreas Directas</b>	160,000	16%	0	0%	0	0%	0	0%	160,000	16%
(Modelación 2027) Hectáreas del proyecto	146,100	15%	0	0%	0	0%			<b>146,100</b>	15%

(Modelación adopción Max) Hectáreas Indirectas totales	340,900	35%	0	0%	511,350	53%			511,350	53%
(Modelación adopción min) Hectáreas Indirectas totales	146,100	15%	0	0%	43,830	5%			146,100	15%

Number of direct beneficiaries by crop and total area (hectares) covered by the project

<i>Beneficiarios</i>	<i>Riesgo agroclimático + Agricultura Digital</i>	<i>Mejoramiento genético</i>	<i>Manejo de agua y emisión de gases</i>	<i>Innovación agrícola en contexto, fortalecimiento organizacional, evaluación y aprendizaje</i>	<i>Proyecto</i>
(Estimación líderes) Beneficiarios directos	126,394	10,421	4,703	53,825	195,343
(Modelación -2027) Beneficiarios del proyecto	234,615	58,763	158,199		451,577
(Modelación - adopción Max) Beneficiarios indirectos	491,618	334,902	809,646		1,636,166
(Estimación líderes) Beneficiarios directos personas	392,380	44,583	11,565	171,164	619,692
<i>Hectáreas</i>					
(Estimación líderes) Hectáreas Directas	1,045,556	122,530	9,180	231000	1,177,266
(Modelación 2027) Hectáreas del proyecto	2,887,735	322,980	1,294,001		4,504,716
(Modelación adopción Max) Hectáreas Indirectas totales	4,352,915	6,593,982	8,143,659		19,090,557

Total beneficiarios directos	619,692
Total hectáreas directas	967,997