

Center for Sustainable Business

Ensuring Protection of Biodiversity and Ecosystem Conservation: Proposed Benefits & Monetization Methods

**April 2023** 



#### **Return on Sustainability Investment (ROSI<sup>™</sup>) Framework**

Sustainability Drivers of Financial Performance & Competitive Advantage



By embedding ESG risk and opportunities within core business strategy, the return on sustainable investment can be quantified, delivering the possibility of both financial value and positive societal impact.

### **Overview of Food & Agriculture Framework**

NYU Stern CSB is developing a ROSI<sup>™</sup> framework for food & agriculture with publicly available monetization tools to help the industry understand where and how sustainability can unlock financial value.

Based on research, experience, and engagement with industry leaders, we have identified the following sustainability strategies\* used by the industry to include in the framework:

Water stewardship	Soil health	Climate change	Chemical management	
Biodiversity and ecosystem conservation	Animal stewardship	Food waste management	Sustainable sourcing	
Food safety and nutrition	Sustainable packaging	Employee and supplier well-being	Brand marketing and communications	

## Identified Sustainability Practices and Sub-Practices Framework Layout

- Through our research, we identified key sustainability practices and sub-practices food and agriculture supply chains are implementing to achieve their sustainability strategies
- Each strategy includes sub-practices which are mapped under the relevant components of the food/agriculture supply chain, (if not relevant to a part of the supply chain, it is excluded)
- There are some benefits that are referenced across multiple strategies
- Compliance / enforcement practices are not explicitly listed in this framework but should be considered when implementing the twelve strategies
- Please see diagram below of the framework layout, which is illustrated for each strategy in the subsequent slides



#### 🌪 NYU STERN

Center for Sustainable Business

# Ensuring protection of biodiversity and ecosystem conservation

#### Practice Mapping: Ensuring protection of biodiversity and ecosystem conservation

	On-farm	Manufacturing/ Processing	tribution	Retail/ Food Service	Consumer Engagement					
Partnerships to Protect	Partner with farmers, civil society, academics, foundations, and/or g soil health,	overnment to protect impor water stewardship)	rtant conse	rvation areas and sp	ecies (e.g. within					
Biodiversity		otection of e species	ecosystems and							
Protect & Restore Critical Habitat	<ul> <li>Map and protect High Conservation/Ecological Value//High Carbon Stock areas in/near production areas to prohibit conversion to agriculture</li> <li>Conserve and manage important watersheds and water bodies</li> <li>Protect pollinators by adopting bee-friendly farming practices, incl planting trees, hedgerows, flora strips, floral meadows, bee hotels</li> <li>Reduce chemical use (incl. applying integrated pest management)</li> <li>Adopt soil health practices on farm to increase biodiversity</li> <li>Seek sustainable agriculture certifications (e.g. no deforestation)</li> </ul>	Monitor supply chain compliance re: deforestation and nature conservation requirements Change product recipes or switch to low-biodiversity impact commodities		Monitor supply chain compliance related to deforestation and nature conservation requirements Change product recipes or switch to low-biodiversity impact	Label products with conservation attributes					
Regenerate Degraded Agricultural Lands	Conduct ecological restoration on degraded land (e.g. plant trees) Identify areas unlikely to provide economic return, remove them from production, manage them to improve biodiversity Transition to organic Adopt cover crops			commodities						
Protect/Restore	Map and implement endangered and threatened species in and adjacent to production areas									

#### 🌾 NYU STERN

Center for Sustainable Business

# **Monetization Approach**

#### **Investing in protection of biodiversity and ecosystem conservation** Overview of Sustainability Strategy and Impact Categories

In the following slides, we will be focusing on benefits from the *Biodiversity* strategy, which are categorized based on the impact categories highlighted below

Sustainability Strategy Definition Investing in Biodiversity & Ecosystem Conservation	Food and Agriculture supply chains are investing in strategies to enhance biodiversity and protect the ecosystems that provide critical inputs for their products.				
Impact Categories	Benefits that				
Operational Efficiency (OE)	Optimize corporate and supply chain efficiencies to lower cost and increase profits				
Sales and Marketing (SM)	Increase volume of sales through brand and marketing policies				
Customer Loyalty (CL)	Attract an increasing community of conscious buyers & consumers, while reducing retention costs				
Risk Management (RM)	Encourage risk mitigation and resilience within the value chain				

#### **Investing in protection of biodiversity and ecosystem conservation** Overview of Sustainability Strategy and Impact Categories

In the following slides, we will be focusing on benefits from the *Biodiversity* sustainability strategy, which are categorized based on the impact categories highlighted below



#### Investing in Partnerships to Protect Biodiversity, ON FARM Overview of Benefits and Monetization Methods

Practice	Sub-Practice	Metric #	Proposed Benefits	Impact Category	Suggested Monetization Methods
Partnerships	Partner with farmers, civil society, academics, foundations, and/or	SS-3	Working with partnership can help farmers attain certification for their products (e.g. organic) which can improve revenue by selling product at a premium	OE	Calculate the volume of product sold with the certification at a premium compared to the same volume of product if it had been sold on the conventional market. Subtract the certification costs to obtain the net benefit
Biodiversity	foundations, and/or government to protect important conservation areas and species SS-5	Reduced price volatility and reduced administrative costs of negotiating contracts	OE	Calculate the margin differential between selling on the spot market and selling through long-term contracts (which is assumed to be a higher price). Multiply this differential by the share of the production impacted to measure avoided loss. Calculate the administrative cost savings in avoiding to renegotiate contracts every year (cost and benefits projection to determine price, lawyer fees, etc.). Subtract investment costs to arrive at net benefit.	

Practice	Sub-Practice	Metric #	Proposed Benefits	Impact Categ.	Suggested Monetization Methods
Protect and Restore Critical Habitat	Map High Conservation Value/High Ecological Value/ High Carbon Stock areas in and adjacent to production areas to prohibit conversion to agriculture	BD-1	Avoided costs linked to avoided destruction of HCV areas leading to excess GHG emissions	RM	Calculate the amount of GHG emissions that would have resulted from unplanned expansion on farm/plantation as compared to the amount emitted by avoiding expanding on HCV land. Multiply the difference by the market price for carbon as a proxy for calculating avoided costs. Subtract investment costs to arrive at net benefit.
		BD-2	Avoid losing sales following scandal linked to risk of deforestation of HCV land	RM	Estimate the probability of losing a customer and related loss in sales and/or deterioration of margin due to diversion to lower-margin sales channels. Calculate related friction costs (administrative costs, extra storage costs, etc.). Subtract investment costs to arrive at net benefit.
	Conserve and manage important watersheds and water bodies	WS-5	Reduced soil erosion/ less runoff related to fertilizer and pesticide use, reducing risk of future water quality regulations and restrictions	RM	Estimated probability of regulations on water quality (for instance, manure use restrictions) and impact on yields. Multiply potential yield reduction by average price to calculate benefits of avoided costs. Subtract investment costs to arrive at net benefit.
		WS-6	Fewer field repairs required due to less soil erosion	OE	Calculate field repair cost savings by comparing current costs per acre with costs per acre before implementing storm management system and multiply by the number of acres to calculate the benefit - can use custom rate estimates to include savings related to machinery, labor and fuel as well. Subtract investment costs to arrive at net benefit.
		WS-2	Reduced negative yield impact due to drought or flooding	RM	Estimated probability of a drought or flood event occurring, estimated the likely impact on yields, and multiply yield reductions by average prices to capture avoided loss in revenues. Subtract investment costs to arrive at net benefit.

Practice	Sub-Practice	Metric #	Proposed Benefits	Impact Categor y	Suggested Monetization Methods
Protect and Restore Critical Habitat		BD-6	Cost savings due to reduce chemical use	OE	Calculate chemical input use prior and after using IPM. Calculate savings by the multiplying the volume saved by the price of chemical-based pesticides. Subtract IMP-related costs (additional farm labor, technological costs, etc.) to calculate final cost savings
	Reduce chemical use	BD-7	Reduced risk of liability related to chemical run-off	RM	Estimate probability of restrictions on water use occurring and the estimated the impact on yields. Multiply potential yield reduction by average price to calculate benefits of avoided costs. Subtract investment costs to arrive at net benefit.
	(including applying integrated pest management)	BD-8	Reduced airborne pesticide pollution effect on pollinator population and preserve yield	RM	Calculate current estimated airborne pesticide and associated yield. Compare to use of alternative bio-control product and associated yield holding all other factors constant and subtracting associated investment costs.
		BD-9	Reduced occurrence of pests and decrease in yield due to biological control of pests	OE	Calculate the differential in yield from parcels adjacent to forests (e.g. 10m) as compared to those father from forests (e.g. 100m), holding all other soil and production conditions similar. Multiply the positive yield difference by the crop price. Subtract investment costs to arrive at net benefit. Note - the insects breeding in forests near field crops are natural predators of crop pests.

Practice	Sub-Practice	Metric #	Proposed Benefits	Impact Category	Suggested Monetization Methods
Protect and Restore Critical Habitat Protect and Restore Critical Habitat Protect pollinators by adopting bee-friendly farming practices including planting trees, hedgerows, flora strips, floral meadows, and bee hotels Seek certification for sustainable agriculture (e.g. no deforestation, organi or bio-based chemicals)	Protect pollinators by adopting bee-friendly farming practices	BD-3	Additional income through the sale of fruits, nuts, and decorative woody floral species	SM	Calculate the volume of fruits, nuts and decorative woody floral species produced yearly. Multiply by sale price on local market or retail, subtracting the additional farm labor, transports, and handling/packaging costs. Subtract investment costs to arrive at net benefit.
	flora strips, floral meadows, and bee hotels	BD-4	Enhanced yield due to higher pollinator population	OE	Calculate the current yield and associated revenues per hectare (base case). Estimate the potential for yield improvement and time period to achieve results. Calculate forecast of new yields expected. Compute increase in forecasted revenues based on incremental yields to capture the financial benefit. Subtract investment costs to arrive at net benefit.
	Seek certification for sustainable agriculture (e.g. no deforestation, organic or bio-based chemicals)	SS-4	Improved revenue by selling product at a premium	SM	Calculate the sales differential by comparing the volume of product sold with the certification at a premium compared to volume of product if it had been sold on the conventional market. Apply the margin % to the sales differential (accounting for costs) to estimate the net benefit. Note that there may be a lower volume produced after implementing the practices.

Practice	Sub-Practice	Metric #	Proposed Benefits	Impact Category	Suggested Monetization Methods
Protect and Restore Critical Habitat Adopt soil health practices on farm to increase biodiversity of plants and species	SH-4	Conservation soil health practices leads to carbon sequestration which the farmer can be compensated for and can reduce Scope 3 emissions for companies	OE, RM	Use a research based estimate for amount of carbon reduced/sequestered per acre related to a specific soil health practice adoption and multiply by impacted acres. Multiply the total amount of carbon reduced/sequestered by an estimate of market value to parties seeking carbon offsets to quantify the benefit	
	SH-5	Conservation soil health practices lead to improved soil structure reducing soil erosion and leads to reductions in nitrogen and phosphorus (N&P) runoff minimizing water use and pollution	RM	Use a research based estimate for amount of N&P reduction per acre related to a specific soil health practice adoption and apply to impacted acres. Multiply the total amount of N&P reduced by estimates of market value to parties seeking water quality offsets to quantify the benefit	
	species	SH-6	Implementing conservation soil health practices increases soil biota and improves soil fertility reducing pesticide use	OE	Calculate pesticide cost before and after implementing practices to improve soil biota and divide by the # of acres farmed during each period to get cost per acre. Multiply difference in cost per acre by total acres to calculate the benefits
	·	SH-7	Implementing conservation soil health practices can lead to an decrease (or in some cases and increase) in herbicide use	OE	Calculate herbicide cost before and after implementing practices to improve soil biota and divide by the # of acres farmed during each period to get cost per acre. Multiply difference in cost per acre by total acres to calculate the benefits or costs

#### Investing in Regenerating Degraded Agricultural Lands, ON FARM Overview of Benefits and Monetization Methods

Practice	Sub-Practice	Metric #	Proposed Benefits	Impact Category	Suggested Monetization Methods
Regenerate Degraded Agricultural Lands	Conduct ecological restoration project on degraded land (e.g. planting trees)	BD-10	Increased biological control of pests leads to cost savings on chemical pest control	OE	Multiply the price times the volume of chemical pest control per year and compare to the price times the volume of bio-control products per year for cost savings.
		BD-11	Reduced carbon emissions and associated fines, loss of business from clients with scope 3 targets	RM	Calculate the amount of GHG emissions on degraded land versus regenerative land. Multiply the difference by the market price for carbon offsets that could have been needed to offset this excess in emissions to measure the avoided costs. Subtract investment costs to arrive at net benefit.
		BD-12	Additional income associated with higher yields from having more land available for harvest	SM	Calculate the current yield and associated revenues per hectare (base case). Estimate the potential for yield improvement and time period to achieve results. Calculate forecast of new yields expected. Compute increase in forecasted revenues based on incremental yields to capture the financial benefit. Subtract investment costs to arrive at net benefit.
	Areas unlikely to provide economic return should be identified and taken out of production and managed in a way that improves biodiversity	BD-13	Improved revenue by selling non-timber products from forest areas (and possible silvopasture uses)	OE	Calculate the volume of non-timber forest product that can be sold in any given year. Subtract investment associated costs to arrive at net benefit.
		BD-2	Avoid losing sales following scandal linked to risk of deforestation of HCV land	RM	Estimate the probability of losing a customer and related loss in sales and/or deterioration of margin due to diversion to lower-margin sales channels. Calculate related friction costs (administrative costs, extra storage costs, etc.)

#### Protect Degraded Agricultural Lands and Endangered Species, ON FARM Overview of Benefits and Monetization Methods

Practice	Sub-Practice	Metric #	Proposed Benefits	Impact Category	Suggested Monetization Methods
Regenerate Degraded Agricultural Lands		CH-3	Cost savings linked to reduced chemical use	OE	Estimate the total volume of chemical used prior to implementing organic agriculture on the farm. Multiply by market price for each chemical product to get the total benefit. Obtain the net benefit by subtracting all the costs of transitioning to organic agriculture
	Transition to organic	CH-4	Improved productivity of workers due to better health	OE	Measure the lower incidence of chemical-related disease contaminating workers and leading to sick days and or early retirement. Measure the reduction in sick days following the transition to organic agriculture and how it affects farm productivity and lowers administration costs. Measure the reduction in worker turnover due to "chemical-induced early retirement" following the transition to organic agriculture and calculate administration cost savings of finding new workers to replace them.
		SS-4	Improved revenue by selling product at a premium	SM	Calculate the sales differential by comparing the volume of product sold with the certification at a premium compared to volume of product if it had been sold on the conventional market. Apply the margin % to the sales differential (accounting for costs) to estimate the net benefit. Note that there may be a lower volume produced after implementing the practices.

#### Protect Degraded Agricultural Lands and Endangered Species, ON FARM Overview of Benefits and Monetization Methods

Practice	Sub-Practice	Metric #	Proposed Benefits	Impact Category	Suggested Monetization Methods
Regenerate Degraded Agricultural Lands	Adopt cover crops	SH-6	Implementing conservation soil health practices increases soil biota and improves soil fertility reducing pesticide use	OE	Calculate pesticide cost before and after implementing practices to improve soil biota and divide by the # of acres farmed during each period to get cost per acre. Multiply difference in cost per acre by total acres to calculate the benefits
Protect/ Restore Endangered Species	Map and implement endangered and threatened species in and adjacent to production areas	BD-5	Improved reputation and increased sales	SM	Estimate the percentage of sales likely to be impacted by a wildlife protection scandal and multiply by total sales to calculate the avoided loss of sales. Subtract investment costs to arrive at net benefit.

#### Investing in Partnerships to Protect Biodiversity, COMPANIES Overview of Benefits and Monetization Methods

Practice	Sub-Practice	Metric #	Proposed Benefits	Impact Category	Suggested Monetization Methods
		SS-13	Companies that engage in improving producer biodiversity ensure their sustainability supply chain goals are met and can increased market share with high sustainability driven customers	SM	Estimate company's current market share with select customers focused on sustainability or all customer segments. Forecast the growth in customer volumes and potential increase in company's share of customer purchases due to sustainability initiatives. Apply company estimate of margin earned to quantify the benefit. Subtract investment costs to arrive at net benefit.
Partnerships to Protect Biodiversity	Partner with farmers, civil society, academics, foundations, and/or government to protect important	Partner with farmers, civil society, academics, SS-10 foundations, and/or government to protect	Companies that engage in improving producer biodiversity ensure their sustainability supply chain goals are met and avoid sustainability-focused scandals that could lead to revenue loss	RM	Categorize customer sales and margins by emphasis on sustainability profiles/categories/segments of customers. Estimate the likely decline in sales to top-sustainability customers and including how this might shift to other segments. Estimate either the change in mix or loss in revenue and multiply by profit margin (differentials or absolute) to estimate the potential loss in earnings. Multiply this result by a probability factor to calculate likely profit loss on sales changes and deduct any additional costs (PR costs, legal costs, etc) to measure avoided costs.
	important conservation areas and species BD-	BD-15	Companies that process and/or trade commodities from producers with certifications that drive improved biodiversity (for instance sustainable palm oil or cocoa) can see increased sales with higher-margin products / products sold at premium / or sold through higher margin channels	SM, OE	Identify quantity of certified product that that the company manages today in the supply chain and incremental amounts to come on stream based on conversion of facilities to certification standards (in case managing the certified product requires distinct supply chain systems to avoid mixing of certified and conventional products). Calculate the current amount of certified product available to the amount sold (sales ratio). Estimate the expected improvement in sales ratio over time, and increase in demand for certified product. Calculate the change in revenues driven by mix shift out of conventional product to a certified product. Apply profit margin by type of product sold, including downgrade costs associated with facility conversions.

#### Investing in Partnerships to Protect Biodiversity, COMPANIES Overview of Benefits and Monetization Methods

Practice	Sub-Practice	Metric #	Proposed Benefits	Impact Category	Suggested Monetization Methods
Partnerships to Protect Biodiversity	Partner with farmers, civil society,	Partner with SS-16 farmers, civil society,	Adding product certifications can increase higher-margin products or products sold at premium (improved mix)	SM	Gather historical sales data (volume, average sale price and margins) for both sustainable and conventionals products. Estimate the sales impact due to adding certifications (overall increase, or change in mix if operating at capacity) and calculate the profit margins. Compare profit results to historical levels (or forecast that excludes adding certifications) to calculate the earnings benefits
	academics, foundations, and/or government to protect important conservation areas and species	BD-16	Companies that switch product ingredients to certified commodities with biodiversity requirements (for instance sustainable versus conventional palm oil) can avoid deforestation by using sustainable certified products and lead to Scope 3 GHG emission reduction	RM	Use forecasted volume mix of certified versus conventional product sold or used in manufacturing, and research based measures of GHG emissions factor for each product type (ideally from a Life Cycle Analysis (LCA)). Calculate how much emissions have been or could be avoided by sourcing sustainable instead of conventional products. Apply cost of carbon to assess cost avoided related to avoided deforestation. Subtract investment costs to arrive at net benefit.
	Pay producers for protection of ecosystems and species	SS-13	Companies that support producers' investment in the protection of ecosystems and species improve their sustainability profile and can increase market share with high sustainability driven customers	SM	Estimate company's current market share with select customers focused on sustainability or all customer segments. Forecast the growth in customer volumes and potential increase in company's share of customer purchases due to sustainability initiatives. Apply company estimate of margin earned to quantify the benefit.

#### **Investing in Protecting and Restoring Critical Habitats, COMPANIES** Overview of Benefits and Monetization Methods

Practice	Sub-Practice	Metric #	Proposed Benefits	Impact Category	Suggested Monetization Methods
Protect and Restore Critical Habitat	Monitoring supply chain deforestation and nature conservation	SS-7	Companies that monitor deforestation and natural conservation activities ensure producers within the supply chain meet company and customer compliance requirements avoiding the costs associated with resolving grievances	OE	Estimate the number of grievances/inquiries historically self-initiated or by NGOs, clients regarding compliance with sustainability standards. Estimate the average employee hours used to resolve requests. Estimate the impact of sustainability initiatives on the number of grievances/inquiries and hours spent to resolve capturing expected cost savings. Subtract investment costs to arrive at net benefit.
		SS-8	Reduction in the likelihood of supply disruption and related costs	OE, RM	Calculate the operational impacts of a supply disruption (using historical cost data related to similar events) or estimating the potential amount of supply likely to be impacted and assessing outcomes (loss in sales or higher substitute procurement costs). Estimate the likelihood of a supply disruption occurring and multiply the by the costs and/or lost sales and margins to calculate the benefit of avoided costs. Potential supply disruption can also be measured using average frequency of orders, cost of delay (for instance \$per pound of product) and apply a research based probability factor of 20% (1 in 5 likely event of an idiosyncratic risk event) to measure the benefit of costs avoided
		SS-9	Reduction in the likelihood of government action and associated penalties/fines	RM	Estimate likelihood of risk event and associated fines and costs incurred to comply with standards. Subtract investment costs to arrive at net benefit.

#### **Investing in Protecting and Restoring Critical Habitats, COMPANIES** Overview of Benefits and Monetization Methods

Practice	Sub-Practice	Metric #	Proposed Benefits	Impact Category	Suggested Monetization Methods
Protect and Restore Critical Habitat	Monitoring supply chain deforestation and nature conservation	SS-10	Avoid revenue loss from sustainability-focused scandals (reputation risk) or lower sustainability rankings/ratings (customer driven)	RM	Categorize customer sales and margins by emphasis on sustainability profiles/categories/segments of customers. Estimate the likely decline in sales to top-sustainability customers and including how this might shift to other segments. Estimate either the change in mix or loss in revenue and multiply by profit margin (differentials or absolute) to estimate the potential loss in earnings. Multiply this result by a probability factor to calculate likely profit loss on sales changes and deduct any additional costs (PR costs, legal costs, etc) to measure avoided costs.
	Change product recipes or switch to low-biodiversity impact commodities	SS-8	Reduction in the likelihood of supply disruption and related costs	OE, RM	Calculate the operational impacts of a supply disruption (using historical cost data related to similar events) or estimating the potential amount of supply likely to be impacted and assessing outcomes (loss in sales or higher substitute procurement costs). Estimate the likelihood of a supply disruption occurring and multiply the by the costs and/or lost sales and margins to calculate the benefit of avoided costs. Potential supply disruption can also be measured using average frequency of orders, cost of delay (for instance \$per pound of product) and apply a research based probability factor of 20% (1 in 5 likely event of an idiosyncratic risk event) to measure the benefit of costs avoided
	Label products with conservation attributes	BD-15	Companies that process and/or trade commodities from producers with certifications that drive improved biodiversity (for instance sustainable palm oil or cocoa) can see increased sales with higher-margin products / products sold at premium / or sold through higher margin channels	SM, OE	Identify quantity of certified product that that the company manages today in the supply chain and incremental amounts to come on stream based on conversion of facilities to certification standards (in case managing the certified product requires distinct supply chain systems to avoid mixing of certified and conventional products). Calculate the current amount of certified product available to the amount sold (sales ratio). Estimate the expected improvement in sales ratio over time, and increase in demand for certified product. Calculate the change in revenues driven by mix shift out of conventional product to a certified product. Apply profit margin by type of product sold, including downgrade costs associated with facility conversions.

#### **Investing in Protecting and Restoring Critical Habitats, COMPANIES** Overview of Benefits and Monetization Methods

Practice	Sub-Practice	Metric #	Proposed Benefits	Impact Category	Suggested Monetization Methods
Protect/ Restore Endangered Species	Map and implement endangered/ threatened species in or adjacent to production areas	BD-5	Improved reputation and increased sales	SM	Estimate the percentage of sales likely to be impacted by a wildlife protection scandal and multiply by total sales to calculate the avoided loss of sales. Subtract investment costs to arrive at net benefit.



Center for Sustainable Business