**Results**

*Macroeconomic analysis*

Models revealed that there were no strong effects of the macroeconomic predictors on forest loss between 1993 and 2015 (Figures Sx – Sx). For each predictor set there were between 5 and 28 models in the top model set and final coefficients were calculated using full averages ( Tables Sx – Sx , Burnham and Anderson, 2007). The largest effects were from two of the control variables (population density, time). The largest effect overall was for population density with a one-year time lag (full averaged coefficient = -632.9, SE = 64.8, Table Sx). The largest effect excluding control variables was for agricultural proportion of GDP (full averaged coefficient = -14.9, SE = 7.9) suggesting that there is a small reduction in the rate of forest loss as the contribution of agriculture to national GDP increases, although this effect is very weak (Figure Sx, Table Sx).

Use point estimates / point predictions – use predict on low x value and high x value to get the resulting y value. Pick x values that are of interest, or current, or relevant for some reason. Can come back to these values in the discussion.

Don’t forget to talk about the macroecon models with forest change as the response. Explain that there were no significant results and to see the SI.

Need to add a column to the results tables called “Rate ratios” which are the exp(coeff). These are the multiplicative terms used to calculate the change in y when x increases by 1 unit.

**Table 3. Parameter coefficients and standard errors from the top model(s) in the macroeconomic analysis. Missing values denote predictor variables that were not selected in the top model(s) for that lag period.**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ***No time lag*** | |  | ***1 year time lag*** | |  | ***2 year time lag*** | |
| **Variable** | **Coefficient** | **SE** |  | **Coefficient** | **SE** |  | **Coefficient** | **SE** |
| ***Macroeconomic*** |  |  |  |  |  |  |  |  |
| GDP | - | - |  | -0.01500 | 0.00340 |  | -0.02600\* | 0.00390 |
| Agricultural proportion of GDP | 0.27000 | 0.07000 |  | 0.25000 | 0.06600 |  | -0.03400\* | 0.07600 |
| Development flows - agriculture | - | - |  | - | - |  | -0.00005\* | 0.00020 |
| Development flows - environment | 0.03100 | 0.00400 |  | - | - |  | -0.00260\* | 0.00450 |
| Foreign direct investment | - | - |  | 0.00360 | 0.00050 |  | 0.00040\* | 0.00060 |
| Population density | -4.43000 | 0.85000 |  | -6.09000 | 0.81000 |  | -7.68000\* | 0.95000 |
| Forest remaining | -0.00030 | 0.00004 |  | -0.00004 | 0.00004 |  | 0.00004\* | 0.00005 |
| ***Commodity / production*** |  |  |  |  |  |  |  |  |
| Change in median market price - corn | 0.02600 | 0.00620 |  | 0.00704\* | 0.00647 |  | -0.00365\* | 0.00329 |
| Change in median market price - rice | -0.00700 | 0.00280 |  | -0.00429\* | 0.00272 |  | 0.00004\* | 0.00058 |
| Change in median market price - rubber | -0.00090 | 0.00031 |  | 0.00019\* | 0.00022 |  | -0.00004\* | 0.00009 |
| Change in median market price - sugar | 0.01336 | 0.00150 |  | 0.00708\* | 0.00127 |  | 0.00877\* | 0.00124 |
| Non-food agricultural production index | 0.00659 | 0.00295 |  | 0.00672\* | 0.00264 |  | -0.00149\* | 0.00203 |
| Crop production index |  |  |  | 0.00042\* | 0.00144 |  | -0.00328\* | 0.00427 |
| Total production from forestry | - | - |  | 0.00000\* | 0.00000 |  | 0.00000\* | 0.00000 |
| Forest remaining | -0.00017 | 0.00004 |  | -0.00017\* | 0.00003 |  | -0.00013\* | 0.00003 |
| ***Producer prices*** |  |  |  |  |  |  |  |  |
| Producer price of corn | 0.00415 | 0.00355 |  | 0.01093\* | 0.00240 |  | 0.00014\* | 0.00081 |
| Producer price of rice | -0.02465 | 0.00436 |  | 0.00452\* | 0.00564 |  | 0.01258\* | 0.00474 |
| Producer price of rubber | 0.03424 | 0.00401 |  | -0.00075\* | 0.00228 |  | -0.00431\* | 0.00467 |
| Producer price of sugar | 0.00004 | 0.00010 |  | 0.00016\* | 0.00018 |  | 0.00000\* | 0.00006 |
| Producer price of cassava | 0.00032 | 0.00123 |  | 0.00006\* | 0.00076 |  | -0.01791\* | 0.00214 |
| Forest remaining | -0.00023 | 0.00002 |  | -0.00015\* | 0.00002 |  | -0.00013\* | 0.00002 |

\* Coefficients derived from full averaging of models within dAIC < 6.

Diagram

Description automatically generated

**Figure 1. Modelled relationships between economic predictors and the allocation of new economic land concessions in Cambodia between 1993 – 2015 using the top model (top and bottom row) and model averaged (middle row) parameters. Top row: no time lag between predictor and response; middle row: 1-year time lag between predictor and response; bottom row: 2-year time lag between predictor and response.**

Diagram

Description automatically generated

**Figure 2. Modelled relationships between commodity price predictors and the allocation of new economic land concessions in Cambodia between 1993 – 2015 using the top model (top two rows) and model averaged (bottom two rows) parameters. Top two rows: no time lag between predictor and response; third row: 1-year time lag between predictor and response; bottom row: 2-year time lag between predictor and response.**

Graphical user interface

Description automatically generated

**Figure 3. Modelled relationships between producer price predictors and the allocation of new economic land concessions Cambodia between 1993 – 2015 using the top model (top two rows) and model averaged (bottom two rows) parameters. Top two rows: no time lag between predictor and response; third row: 1-year time lag between predictor and response; bottom row: 2-year time lag between predictor and response.**

**Table 4. Model outputs from the top models from the socioeconomic analysis. Outputs are for the commune-level analysis and the province-level analysis.**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Variable** | **Variance** | **Std.Dev** | **Coefficient** | | **SE** |
| ***Commune-level final model*** |  |  | |  |  |
| *Random effects* |  |  |  | |  |
| Commune (intercept) | 10.4500 | 3.2334 | - | | - |
| Year/Commune (slope) | 0.0046 | 0.0680 | - | | - |
| Province (intercept) | 6.7730 | 2.6025 | - | | - |
| Year/Province (slope) | 0.0005 | 0.0220 | - | | - |
| *Fixed effects* |  |  |  | |  |
| Intercept | - | - | -4.6240 | | 0.5620 |
| Population density | - | - | -7.5140 | | 1.1270 |
| Mean elevation | - | - | 1.0510 | | 0.1220 |
| Distance to In'tl border | - | - | 0.5805 | | 0.2036 |
| Distance to Provincial capital | - | - | 0.6929 | | 0.1114 |
| ELC presence | - | - | 0.0000 | | 0.0025 |
| PA presence | - | - | 0.0093 | | 0.0143 |
| ***Province-level final model*** |  |  |  | |  |
| *Random effects* |  |  |  | |  |
| Province (intercept) | 1.1762 | 1.0845 | - | | - |
| Year/Province (slope) | 0.0058 | 0.0765 | - | | - |
| *Fixed effects* |  |  | - | | - |
| Intercept | - | - | -2.9900 | | 0.4497 |
| Males in school (low) | - | - | 0.0051 | | 0.0019 |
| Distance to school (low) | - | - | -0.0174 | | 0.0022 |
| Mean elevation (low) | - | - | -0.0223 | | 0.0024 |
| Distance to border (low) | - | - | 0.0061 | | 0.0019 |
| Distance to Prov capital (low) | - | - | -0.0072 | | 0.0019 |
| Presence of economic concessions (1) | - | - | 1.9974 | | 0.4090 |
| Presence of PAs (1) | - | - | 2.8063 | | 0.4965 |

Chart, scatter chart

Description automatically generated

**Figure 4. Predicted relationships (red lines) between socioeconomic variables and forest cover in Cambodia between 2007 – 2012 from the top commune-level model. Predictions are ‘global’ i.e., all random effects were set to their mean values, and thus predictions are not for any specific commune. Black dots are the raw data points of each predictor versus forest cover.**

Diagram, shape, arrow

Description automatically generated

**Figure 5. Predicted relationships between population density and forest cover within Cambodian provinces between 2007 – 2012 using the top commune-level model. Faded grey lines are the predictions for each individual commune within each province. Black lines are the mean provincial predictions, which were computed using the 50% quantile from all commune predictions. Plot panels have non-standard y axis ranges.**

A picture containing diagram

Description automatically generated

**Figure 6. Predicted forest cover within each Cambodian province given high and low levels of school attendance (males aged 6 – 24 in school) from the top province-level model. All other variables in the model were set to their reference level (distance to school = low, elevation = low, distance to international border = low, distance to provincial capital = low, economic land concession = yes, protected area = yes).**

A picture containing diagram

Description automatically generated

**Figure 7. Predicted forest cover within each Cambodian province given high and low distances to the nearst school from the top province-level model. All other variables in the model were set to their reference level (school attendance = low, elevation = low, distance to international border = low, distance to provincial capital = low, economic land concession = yes, protected area = yes).**

Socioecon models – report marginal and conditional R2