# Appendix A



Figure S1: WoE for the different values of slope angles (SLOPE) in VS\_R2, for the transition between extensive agriculture and open forest. The higher the WoE values, the greater the probability of the transition occurring, while low values of WoE indicate a lower probability. This plot shows an example of when the WoE needs to be edited to correct statistically insignificant WoE values.

Figure S2: WoE (y-axis) for the relationship between the mean annual precipitation in mm (x-axis) with the transition from shrubland to open forest, in VS\_R1, VD\_R2 and VS\_R2.

Table 1 - Table 4 list, for each model, the transitions, and drivers used, as well as their influence over each transition displayed by means of a heatmap matrix. The drivers influence was obtained by summing their absolute values and the colour scales were defined for each transition. The drivers influence is represented in red to light blue colour scheme. Strong influence between the drivers and the transition is displayed in red, weak influence is displayed in light blue. Drivers with weak influence and excluded from the modelling are displayed in dark blue.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **From** | **1** | **2** | **3** | **4** | **5** |  |  |
| **Drivers** | **To** | **2** | **4** | **5** | **1** | **4** | **5** | **8** | **4** | **5** | **8** | **2** | **3** | **5** | **8** | **9** | **2** | **4** | **6** |  |  |
| **DD to 1** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DD to 2** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DD to 3** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DD to 4** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DD to 5** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DD to 6** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DD to 8** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DD to 9** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Not |
| **ELEVATION** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | considered |
| **SLOPE** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Excluded |
| **TOPO** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **TWI25** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Min (>0.5) |
| **TRI** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **TEMP** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **PCP** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **SWB** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **MSRAD** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Max |
| **MMIND** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **GAMS** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **APTSOIL** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **LIMAGRIC** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **POP** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DensityRoad** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DistAA** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DistHydro** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DistPerturb** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

*1: closed forest; 2: open forest; 3: permanent crops; 4: intensive agriculture; 5: extensive agriculture; 6: shrubland; 8: urban; 9: industry*

Table S1: Drivers influence over each transition for VD\_R1. In grey, variables that were not considered; in dark blue excluded variables with $\sum\_{}^{}\left|WoE\right|\leq 0.5;$ from light blue to red, the contribution of each driver to the respective land use transition.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  **From** | **1** | **2** | **3** | **4** | **5** | **6** |  |  |
| **Drivers**  |  **To** | **2** | **1** | **3** | **4** | **4** | **8** | **3** | **5** | **8** | **9** | **4** | **2** |  |  |
| **Dynamic Dist to 1** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 2** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 3** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 4** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 5** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 6** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 8** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 9** |  |  |  |  |  |  |  |  |  |  |  |  |  | Not |
| **ELEVATION** |  |  |  |  |  |  |  |  |  |  |  |  |  | considered |
| **SLOPE** |  |  |  |  |  |  |  |  |  |  |  |  |  | Excluded |
| **TOPO** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **TWI25** |  |  |  |  |  |  |  |  |  |  |  |  |  | Min (>0.5) |
| **TRI** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **TEMP** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **PCP** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **SWB** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **MSRAD** |  |  |  |  |  |  |  |  |  |  |  |  |  | Max |
| **MMIND** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **GAMS** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **APTSOIL** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **LIMAGRIM** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **POP** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DensityRoad** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DistAA** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DistHydro** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DistPerturb** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

*1: closed forest; 2: open forest; 3: permanent crops; 4: intensive agriculture; 5: extensive agriculture; 6: shrubland; 8: urban; 9: industry*

Table S2: Drivers influence over each transition for VS\_R1. In grey, variables that were not considered; in dark blue excluded variables with $\sum\_{}^{}\left|WoE\right|\leq 0.5$; from light blue to red, the contribution of each driver to the respective land use transition.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  **From FromTo** | **1** | **2** | **4** | **5** | **6** | **11** |  |  |
| **Drivers** |  **To To** | **2** | **5** | **1** | **5** | **2** | **5** | **8** | **1** | **2** | **4** | **6** | **1** | **2** | **5** | **13** |  |  |
| **Dynamic Dist to 1** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 2** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 3** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 4** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 5** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 6** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 8** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 9** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 13** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Not |
| **ELEVATION** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | considered |
| **SLOPE** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Excluded |
| **TOPO** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **TWI** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Min (>0.5) |
| **TRI** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **TEMP** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **PCP** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **SWB** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **MSRAD** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Max |
| **MMIND** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **GAMS** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **APTSOIL** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **LIMAGRIM** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **POP** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DensityRoad** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DistAA** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DistHydro** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

*1: closed forest; 2: open forest; 4: intensive agriculture; 5: extensive agriculture; 6: shrubland; 8: urban; 11: glaciers and permanent**snow; 13: rocks and sand.*

Table S3: Drivers influence over each transition for VD\_R2. In grey, variables that were not considered; in dark blue excluded variables with $\sum\_{}^{}\left|WoE\right|\leq 0.5$; from light blue to red, the contribution of each driver to the respective land use transition.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **From** | **1** | **2** | **4** | **5** | **6** | **11** |  |  |
| **Drivers** |  **To** | **2** | **5** | **1** | **4** | **5** | **8** | **1** | **2** | **5** | **6** | **8** | **2** | **4** | **6** | **8** | **1** | **2** | **13** |  |  |
| **Dynamic Dist to 1** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 2** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 3** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 4** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 5** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 6** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 8** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 9** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Dynamic Dist to 13** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Not |
| **ELEVATION** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | considered |
| **SLOPE** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Excluded |
| **TOPO** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **TWI** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Min (>0.5) |
| **TRI** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **TEMP** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **PCP** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **SWB** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **MSRAD** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Max |
| **MMIND** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **GAMS** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **APTSOIL** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **LIMAGRIM** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **POP** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DensityRoad** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DistAA** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **DistHydro** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

*1: closed forest; 2: open forest; 4: intensive agriculture; 5: extensive agriculture; 6: shrubland; 8: urban; 11: glaciers and permanent**snow; 13: rocks and sand.*

Table S4: Drivers influence over each transition for VS\_R2. In grey, variables that were not considered; in dark blue excluded variables with $\sum\_{}^{}\left|WoE\right|\leq 0.5;$ from light blue to red, the contribution of each driver to the respective land use transition.