

# Medieval Millennium Terrain

## I. Overview

Terrain management is a significant aspect of Medieval Millennium. This is the era when the great primeval forests of central and northern Europe were gradually tamed and cleared into cropland and pasture. In the warmer and drier climates of southern Europe, diminishing populations at the beginning of this period were supported by cultivation practices that persisted from the Roman Empire, but eventually this region also began to grow again and required additional food production.

At the beginning of the game, therefore, the majority of the map consists of wild land in its native states: Heathland, Dense Forest, Pine Forest, Marsh/Fen, Sea, Hills, and Mountains. Your task is to utilize or convert these terrains into ones that can support the growth and expansion of your nation. But geography and terrain are not at the mercy of man, bent to his every whim. You will have to contend with terrain that depletes if it is overworked; terrain that reverts to its native, wild state if it lies abandoned; climate change due to the Medieval Warm Period and the Little Ice Age; urbanization caused by city sprawl; and even forest fires.

Medieval Millennium contains 16 terrain types, taking full advantage of the additional types made available by TOTPP.

## II. Health 🏰

The first resource produced by a tile is "Health", renamed from "Food" in the base game. The revised name reflects the fact that Health is what directly drives city growth; food production and variety is naturally a key component of this, but not the only factor. None of the native terrain types generate more than 1 Health, and since 2 Health are required to maintain each citizen, using the "irrigate" option to clear and potentially irrigate the land is of critical importance.

## III. Materials ⌚

















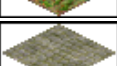


The second resource produced by a tile is "Materials", renamed from "Shields" in the base game. The revised name reflects the fact that Materials are what directly drive the production of city improvements, wonders, and units by the city. As a result, this encompasses all types of resources that could be used for construction, weapons, clothing, etc. In addition, the icon used for Materials is in an hourglass shape, because a key component of city productivity is *time*. No matter how much stone is available, building a cathedral requires a great deal of human effort on the part of the workers; similarly, no matter how many weapons are available, producing a knight requires time for training.

Although clearing land in order to generate Health is important, this will also reduce the amount of Materials that can be generated by that tile. In some cases, you will want to use the "mine/woodcut" option instead, to increase the rate at which Materials are collected from a tile while leaving it in its native state.

## IV. Trade 🏪

The third resource produced by a tile is "Trade", just as in the base game. The generation and utilization of this resource is similar to the base game as well.







V. Terrain Types Table







Image	Terrain Type	Health 	Materials 	Trade 	Move Cost	Defensive Bonus	Result of Irrigation	Result of Mine/Woodcut	Effect of Road	Result of Terraform	Special Resources
	Arable (poor)	1	0	0	1	Normal	+1 Health (8 turns)	n/a	+1 Trade	Pasture (8 turns)	Clay, Domestic Fowl
	Arable	2	0	0	1	Normal	+1 Health (6 turns)	n/a	+1 Trade	Woodland (8 turns)	Small Game, Pigs
	Arable (lush)	2	1	1	1	Normal	+2 Health (6 turns)	n/a	+1 Trade	n/a	Honey, Horses
	Dense Forest	1	1	0	3	+50%	Woodland (10 turns)	+2 Materials (6 turns)	none*	n/a	Timber, Red Deer
	Heathland	1	1	0	1	Normal	Pasture (8 turns)	+1 Material (8 turns)	none*	n/a	Wild Fowl, Goats
	Hills	1	1	0	4	+50%	Terraced Hills (12 turns)	+2 Materials (10 turns)	none*	n/a	Limestone, Wild Boar
	Marsh/Fen	0	0	0	4	+50%	Arable (12 turns)	n/a	none*	n/a	Eels, Reeds
	Monastery	1	0	3	2	+50%	n/a	n/a	+1 Trade	n/a	Abbey Ale, Goods and Tools
	Mountain Pass	0	1	0	3	+100%	n/a	+1 Material (12 turns)	none*	n/a	Iron Ore, Silver
	Mountains	0	0	0	5	+100%	n/a	Mountain Pass (10 turns)	none*	n/a	Iron Ore, Silver
	Pasture	2	0/1	0	1	Normal	n/a	n/a	+1 Trade	Heathland (8 turns)	Pasture+
	Pine Forest	1	1	0	3	+50%	Woodland (10 turns)	+2 Materials (6 turns)	none*	n/a	Amber, Bears
	Sea	1	0	2	1	Normal	n/a	n/a	n/a	n/a	Herring, Salmon
	Terraced Hills	2	0	0	2	+50%	+1 Health (12 turns)	+1 Material (10 turns)	none*	Hills (16 turns)	Grapes, Olives
	Urban	0	2	2	1	Normal	n/a	n/a	+1 Trade	n/a	Artesian Well, Public Garden
	Woodland	1	1	0	2	Normal	Arable (8 turns)	+1 Material (6 turns)	none*	n/a	Orchard, Foxes

\* A road will always add +1 Trade to a tile that already produces at least 1 Trade. Also, a road reduces the movement cost of any terrain to ½ of a movement point.

VI. Resource Specials Table

All terrains except Pasture and Pasture+ may contain two special resources that increase their Health, Materials, or Trade productivity. In one special case (highlighted in red below), gains in two of these areas are slightly offset by a decline in the third area.

Terrain Type	Special	Increase			Total		
							
Heathland	Wild Fowl	2		1	3	1	1
Heathland	Goats	2		1	3	1	1
Dense Forest	Timber		2	1	1	3	1
Dense Forest	Red Deer	2		2	3	1	2
Pine Forest	Amber			4	1	1	4
Pine Forest	Bears	1		1	2	1	1
Marsh/Fen	Eels	2		1	2	0	1
Marsh/Fen	Reeds		1	2	0	1	2
Hills	Limestone	-1	3	1	0	4	1
Hills	Wild Boar	1		2	2	1	2
Mountains	Iron Ore		2	1	0	2	1
Mountains	Silver		1	3	0	1	3
Sea	Herring	2		1	3	0	3
Sea	Salmon	2		1	3	0	3

Terrain Type	Special	Increase			Total		
							
Woodland	Orchard	2		1	3	1	1
Woodland	Foxes		1	2	1	2	2
Arable (lush)	Honey	1		1	3	1	2
Arable (lush)	Horses		1	2	2	2	3
Arable	Small Game	1		1	3	0	1
Arable	Pigs	1	1		3	1	0
Arable (poor)	Clay		2		1	2	0
Arable (poor)	Domestic Fowl	1		1	2	0	1
Terraced Hills	Grapes	1		2	3	0	2
Terraced Hills	Olives	1		1	3	0	1
Mountain Pass	Iron Ore		3	2	0	4	2
Mountain Pass	Silver		1	5	0	2	5
Monastery	Abbey Ale	1		2	2	0	5
Monastery	Goods and Tools		1	2	1	1	5
Urban	Artesian Well	2			2	2	2
Urban	Public Garden	2			2	2	2

## VII. Tile Improvements

### a. Irrigation

Once a tile has been cleared to Arable, or hilly terrain has been changed to Terraced Hills, the land can be irrigated to increase the amount of Health that it produces. When your nation acquires the Enclosed Fields advance, these tiles can be irrigated a second time to upgrade the irrigation improvement to enclosed fields. This provides an even larger Health bonus to a city that has built the corresponding Enclosed Fields improvement.

### b. Mine/Woodcut

The base Civilization II concept of mining has been expanded to include the concept of woodcutting. As a result, Peasants can now build the "mine/woodcut" improvement in wooded terrains; in these locations it represents a dedicated woodcutting operation, and results in an increase in the quantity of Materials produced. Peasants can also build the "mine/woodcut" improvement in Hills or Mountains, where it represents a more traditional mine. The game icon has been changed to a double-headed axe to symbolize this dual concept.

### c. Roads

A unit traveling on a road uses only 1/2 of a movement point per tile (displayed in the game as 3/6), regardless of the underlying terrain type.

Roads also offer a benefit to the Trade produced by a tile. If a tile already produces at least 1 Trade, the road will add 1 additional Trade. On the other hand, if a tile produces no Trade, a road will add the first Trade only on Arable (poor), Arable, or Pasture terrain. (Arable (lush) terrain always produces at least 1 Trade even without a road.)

In order to build a road on a tile with a river, your nation must have the Bridge Building advance.

Building a road on a Mountain tile does not actually generate the road, but instead turns the terrain into a Mountain Pass. This allows any land unit to move through the tile; a road can then be built on the Mountain Pass to provide standard benefits.

### d. Royal Highways

Royal highways replace the base game concept of railroads. Peasants, Serfs, and Yeomen can upgrade a tile with a road to a royal highway once your nation acquires the "Stone-paved Roads" advance.

A unit traveling on a royal highway uses only 1/3 of a movement point per tile (displayed in the game as 2/6), regardless of the underlying terrain type.

A royal highway preserves the benefit to Trade that is provided by a road, and also offers a benefit to the Materials produced by a tile. If a tile generates 2 or more Materials, then the royal highway provides an increase of 50%, rounded down. That is, a tile producing 2 or 3 produces 1 more; a tile producing 4 or 5 produces 2 more; and a tile producing 6 produces 3 more.

## VIII. Rivers

A river adds one extra Health to Woodland tiles, unless the tile contains a mine/woodcut improvement. A river adds one extra Trade to the output of any tile.

Rivers provide a movement multiplier of 1 for units moving along them, assuming the land does not also have a road or royal highway. In other words, a unit traveling along a river uses only 1 movement point per tile, regardless of the underlying terrain type. A river therefore provides no movement benefit if the terrain type already costs 1 movement point to traverse, but allows a unit to move more quickly through terrain with a higher movement cost.

Rivers offer a natural defense boost of 50% in battle.

In order to build a road on a tile with a river, your nation must have the Bridge Building advance.

## IX. Castles (Fortresses)

Fortresses are renamed as castles in Medieval Millennium. Under the Constitutional Monarchy government, a unit stationed inside a castle tile improvement built within three tiles of its home city does not cause unhappiness. Barbarian units will never spawn on a tile which is adjacent to a defended castle, so building castles on the perimeter of your nation can be an effective way to keep the barbarians away from developed tiles.

There are three types of castles available in Medieval Millennium. The first type is the Motte and Bailey castle, which becomes available when the advance of that name is acquired. This allows peasant-type units to use the "fortress" command (available through the menu, or by pressing the [f] key) to add a Motte and Bailey castle to any tile. This tile improvement doubles the defensive strength of units on that tile.

The second type is the Stone Castle, which likewise becomes available when the advance of that name is acquired. At that point in time, all Motte and Bailey tile improvements in your territory will be converted to immobile Motte and Bailey units, and the tile improvement will be removed. The Motte and Bailey unit has a defensive strength of 4 and 2 hit points but is always created as a veteran unit, which gives it an effective defensive strength of 6. As a result, the castle itself will defend against many attacks, but no longer confers a defensive bonus on other units located there. You will also be prompted to save and reload your game, so that an event can adjust image files used by the game. Peasant-type units can continue to use the "fortress" command, and doing so will still add the castle tile

improvement with the standard benefit, but the castle image will now be that of a Stone Castle. If a Stone Castle tile improvement is constructed on a tile that contains a Motte and Bailey unit, the unit will be removed; essentially, you have just upgraded the castle.

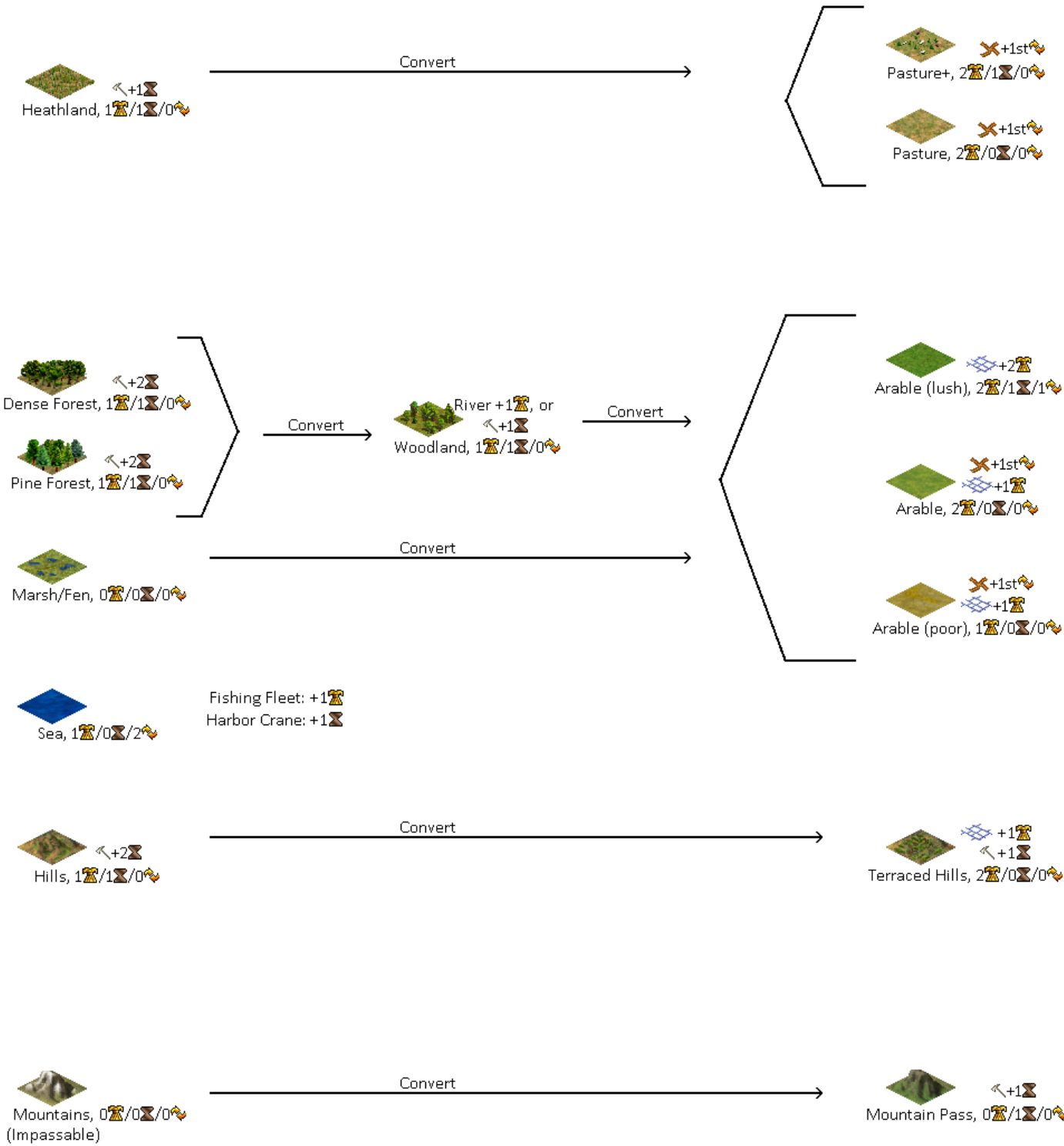
The third and final type of castle is the Bastion Fortress, which becomes available when the Corned Gunpowder advance is acquired. At that point in time, all Motte and Bailey units will be removed from the game (these older castles have crumbled away, since they were never upgraded to Stone Castles). All Stone Castle tile improvements in your territory will be converted to immobile Stone Castle units, and the tile improvement will be removed. The Stone Castle unit has a defensive strength of 4 and 3 hit points (1 more HP than the Motte and Bailey unit) and is likewise created as a veteran unit, which gives it an effective defensive strength of 6. As a result, the castle itself will defend against many attacks, but no longer confers a defensive bonus on other units located there. You will again be prompted to save and reload your game. Peasant-type units can continue to use the "fortress" command, and doing so will still add the castle tile improvement with the standard benefit, but the castle image will now be that of a Bastion Fortress. If a Bastion Fortress tile improvement is constructed on a tile that contains a Stone Castle unit, the unit will be removed; essentially, you have just upgraded the castle.

X. Clearing and Converting Terrain

Each of the native terrain types, except for Sea, can be converted to another type in order to alter or improve its productivity. For nearly all terrain types, this is necessary in order to allow the tile to generate additional Health, which is critical for the growth of each city. However, note that it is not always necessary or advisable to convert every tile, depending on the type of resource that you would like that tile to generate. For example, converting a Dense Forest tile to Woodland, and then to Arable, is necessary to increase the amount of Health it can produce. However, this will simultaneously reduce the potential of this tile to generate Materials. A city will thrive and become most valuable when the nearby tiles have a balance of different terrain types, with different types of tile improvements (irrigation, mine/woodcut, road, etc.).

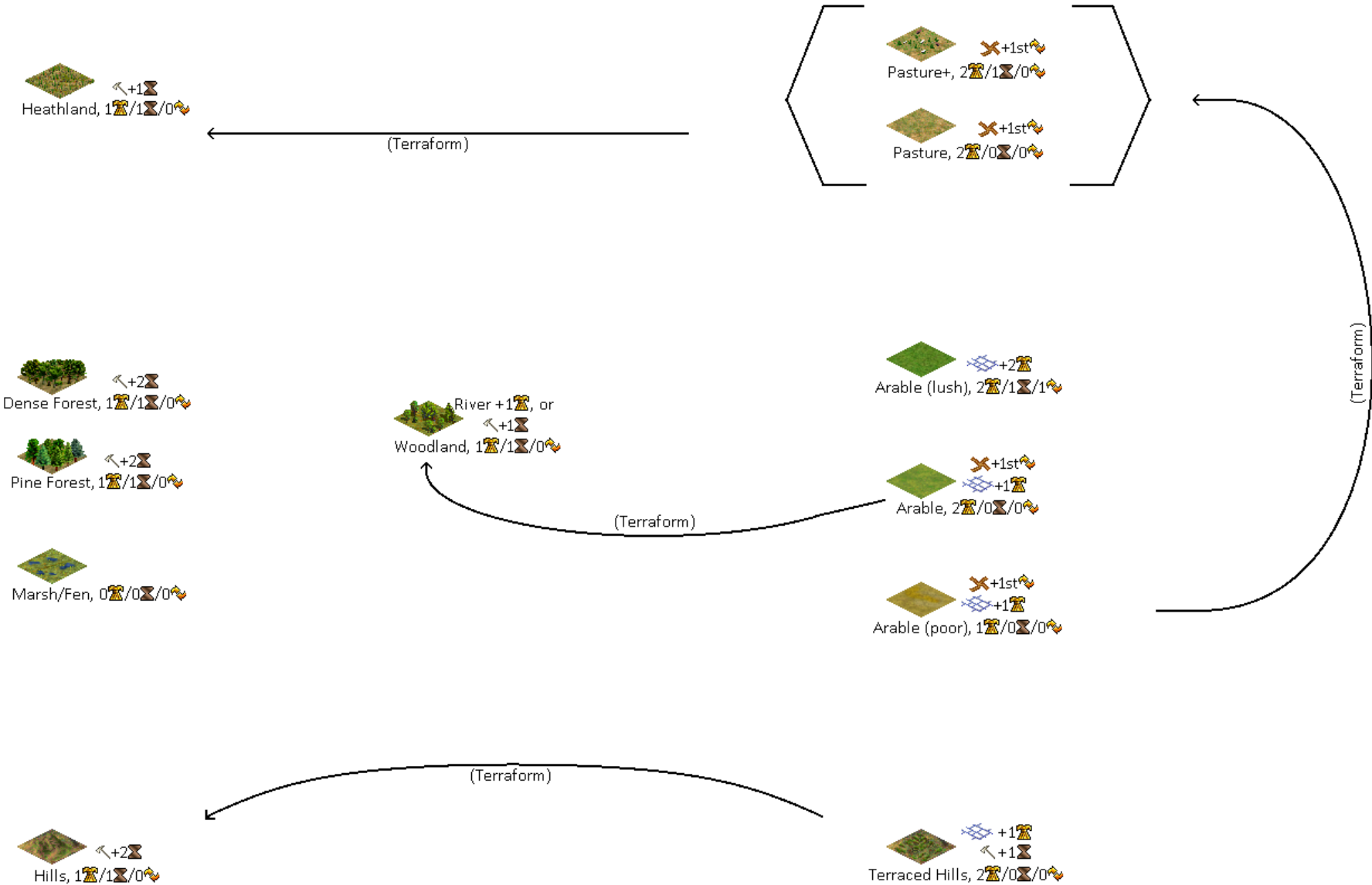
Note that when Heathland is converted to Pasture, the result is split evenly between the two types of Pasture, with approximately a 50% chance of each. When converting to the Arable terrains, the result will be the standard Arable terrain approximately 80% of the time, but will randomly turn out to be either Arable (lush) or Arable (poor) the other 20% of the time. Terrain that is natively Pine Forest is less likely to be "lush" and more likely to be "poor" terrain compared to that which is natively Dense Forest. Terrain that is natively Marsh/Fen is more likely to be either "lush" or "poor", with a smaller percentage of standard Arable.

The following diagram shows the basic land transformations available to you:



XI. Terraforming Terrain

In the latter part of the game, you will have the option to "terraform" certain terrain types. If you realize that you have cleared more of your land than necessary or ideal, this action allows you the *possibility* of increasing Materials production in some tiles. It's not clear that this will always be necessary, however, or even to your advantage. Four possible terraforming actions exist: from Arable land back to Woodland, from Arable (poor) land to Pasture, from Pasture back to Heathland, and from Terraced Hills back to Hills.

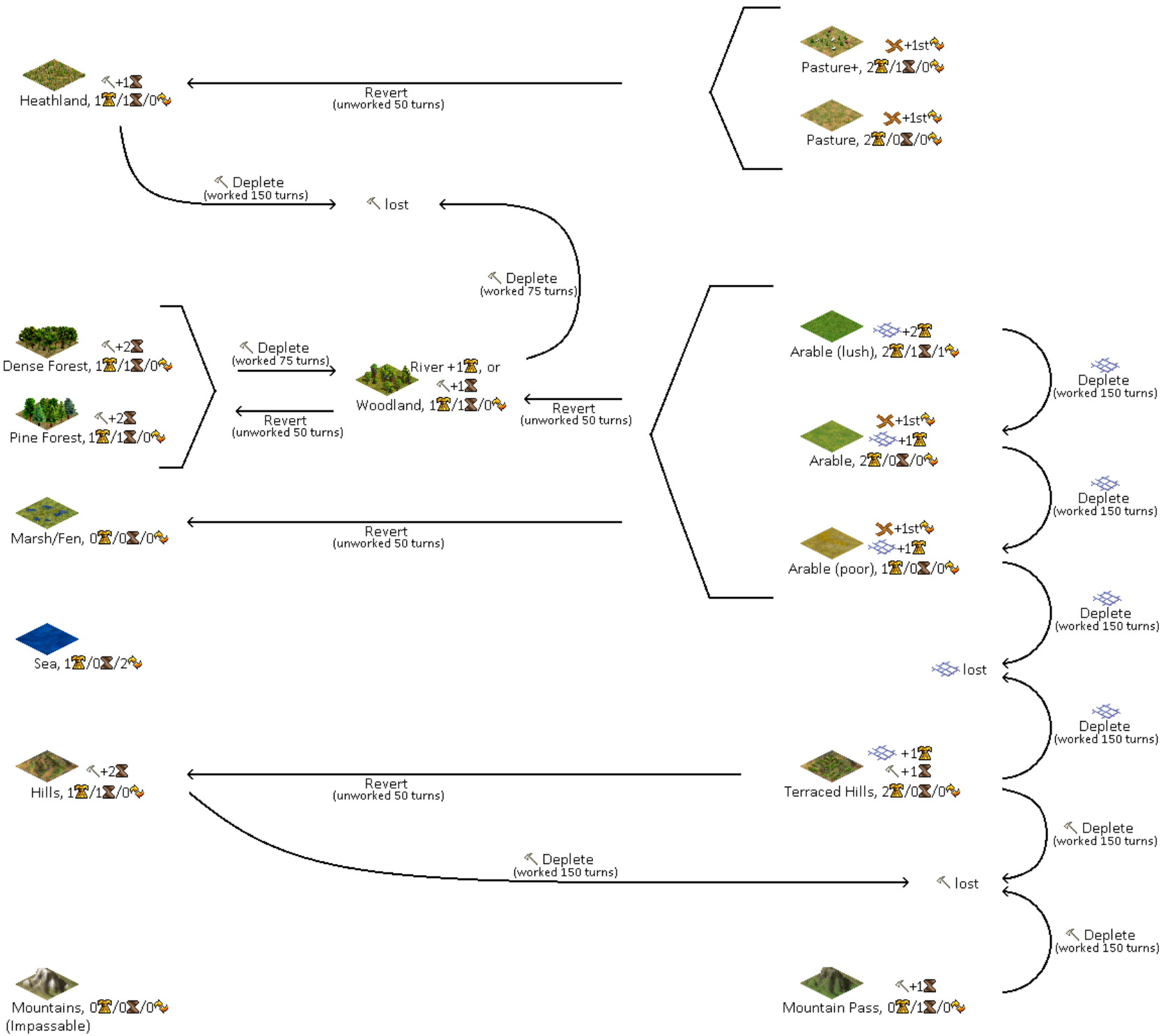


XII. Depleting and Reverting Terrain

Unfortunately, many aspects of modern farming were unknown in the medieval period. Without hybrid crops, chemical or synthetic fertilizers, or modern sustainability practices, the land was often stretched to its limit to provide for the population. Within Medieval Millennium, land with a mine/woodcut or with irrigation will deplete if it is worked by a city for several centuries, which can cause improvements to be lost or the terrain type itself to change to a less productive type. This depletion happens more quickly on wooded terrains (75 turns) than on rocky or irrigated terrains (150 turns).

Furthermore, even cleared and improved land must be worked regularly. If a tile is not worked by a city for 100 years (50 turns), tile improvements will be lost and it will eventually revert to its native state. You will need to clear or improve it again if your city requires reasonable productivity from this land.

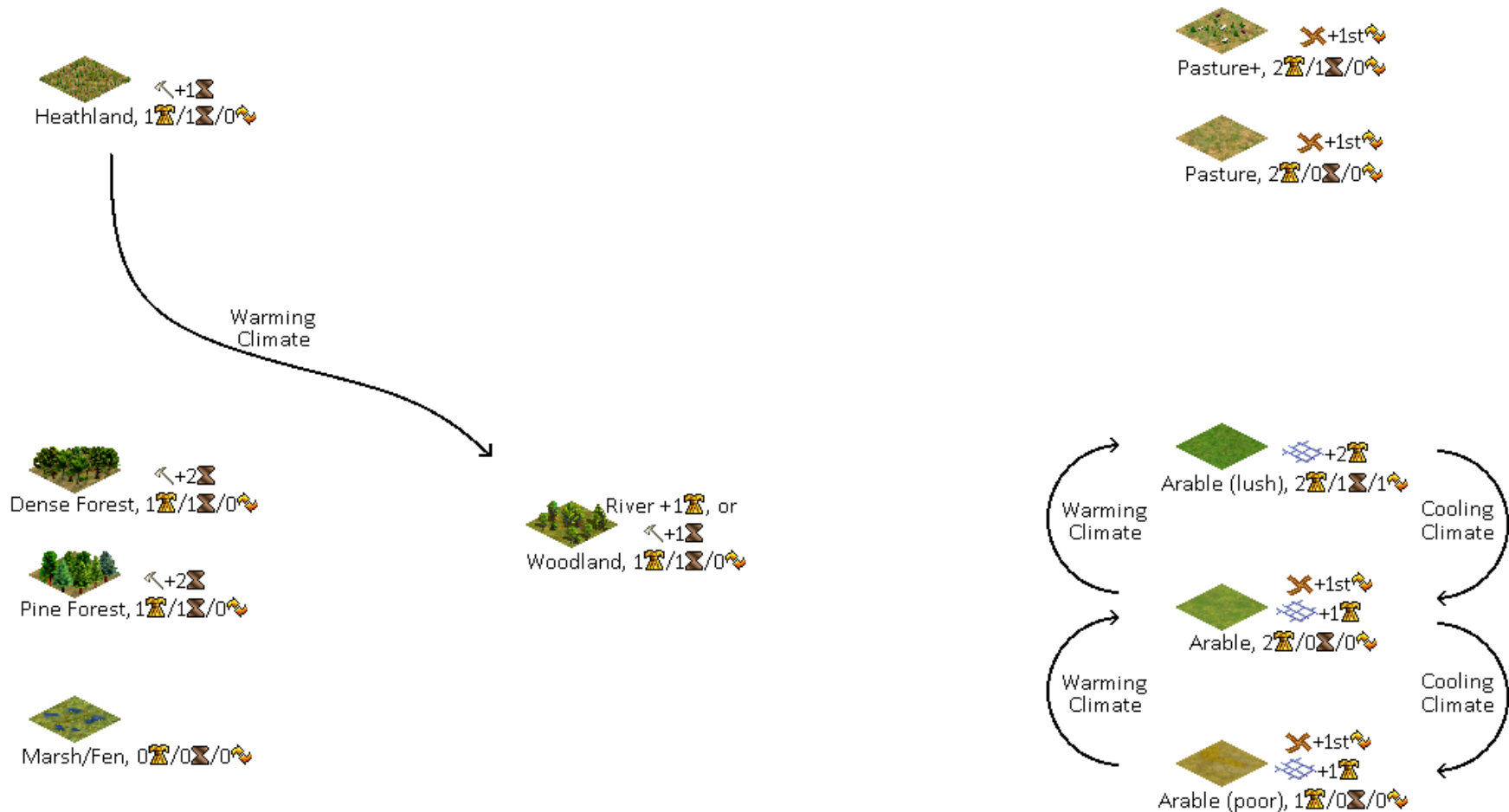
These two actions, depleting and reverting, are shown in the following diagram:



XIII. Climate Warming or Cooling

During this era of history, climatic changes known today as the Medieval Warm Period and the Little Ice Age caused shifts in growing seasons and land productivity. Medieval Millennium models this as well, in two ways: first, the climate at any given point in time affects the likelihood of freshly cleared Arable land to become lush or poor. Second, existing land also has the possibility to change to a more favorable (during warm periods) or less favorable (during cooler periods) type of terrain.

The following diagram shows terrain changes that may occur due to climate:



XIV. Impassable Terrain

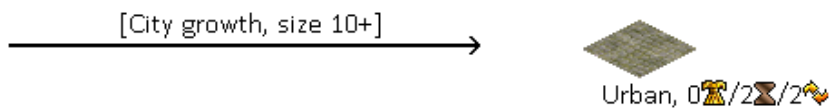
The terrain type of Mountains is impassable to all units, except for settler-type units and Scouts. Building a road, mine/woodcut, or castle on such a tile will convert it to Mountain Pass terrain, which is then accessible by any unit. The road, mine/woodcut, or castle will be removed as part of the transformation but could be rebuilt on the new Mountain Pass if desired.

XV. City Terrain

When you build a new city, the tile on which it is located will automatically be cleared and converted to the most developed form possible, in order to reasonably support a city. It isn't necessary to change the terrain of a future city site first, before founding the city. The city creation will perform this action automatically.

When a city reaches size 10, the tile on which the city is located will be converted to the terrain type of Urban. This reflects the fact that the city has now grown large enough to encompass that entire land area, replacing the native terrain at that location. As a city increases to size 14, the same terrain change will take place on a tile adjacent to the city, and again at sizes 16, 18, and 20, for a total of up to five Urban tiles within the city radius.

As documented in the Civlopedia entry, an Urban tile produces no Health (unless the tile happens to have a special resource). This puts considerable pressure on the other (outlying) tiles in the city radius to generate enough Health that the city's population remains stable or increases. However, Urban tiles do produce increased levels of Materials and Trade. In general, this game mechanism can tend to limit the population of many cities, limiting explosive population growth except for cities with extremely advantageous locations.

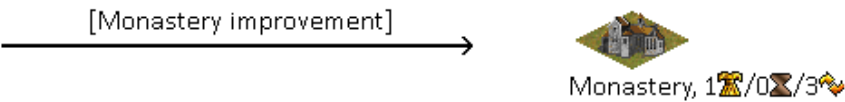




XVI. Monastery

When a city builds a Monastery improvement, two events take place simultaneously. The first is that a land tile within the city radius will be converted to the terrain type of Monastery. The second is that an immobile Monks unit will be created on this tile.

Monastery terrain provides a small amount of Health, no Materials, and a substantial amount of Trade. Units may travel freely through a Monastery tile, and you may build a road or royal highway there if you wish. However, no other type of terrain improvement is possible, and it is not permitted to found a new city or build a castle on this site.



XVII. Summary Diagram

The following diagram brings all of these changes together.

